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IN THIS ISSUE

THE extreme food shortage throughout Europe in the spring and early summer of 1947 has been reported in considerable detail. Less information has been available on the ration levels in the Ukraine where near famine conditions existed as a result of crop failures in 1946 and termination of UNRRA supplies. A report on "Nutrition in the Ukrainian S.S.R." by Dr. William P. Forrest, Chief Medical Officer of the UNRRA Mission to the Ukraine, is published in the following pages. Prepared in March, 1947, this report shows that the people were subsisting almost entirely on bread at that time and that the caloric value of the diet available to the normal adult consumer and to children under 14 years of age was about 1,000 calories daily. With supplies of food at the vanishing point, abundant crops in 1947 are essential to prevent a more critical situation in the forthcoming winter.

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The leading position of the chronic diseases as causes of disability and death has served in recent years to broaden the scope of public health activities. A comprehensive program of control and alleviation of chronic conditions, however, requires more knowledge of particular diseases and their causes than is now available.

The article "Chronic Disease Among Spouses" by Jean Downes presents an analysis of the prevalence and incidence of chronic disease and the association of specific chronic conditions in a unique population, young, middle-age, and old-age husbands and wives who had shared the same environment over varying periods of years. The general results of this study

indicate that there is a tendency for chronic disease to be concentrated among spouses in family units. A significant association of illness in both husband and wife was found for all circulatory diseases combined, for hypertensive vascular disease, and for arthritis. These and other findings of the study emphasize the need for greater consideration of the patient in his social setting with particular attention to the family environment.

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Three papers under the general title "Genetic and Social Significance of Differential Fertility" are published in this issue. They were presented originally at a round table devoted to this subject at the meetings of the Population Association of America, held in Princeton, New Jersey, May 17–18, 1947. The authors, Drs. Harold F. Dorn, Laurence H. Snyder, and Gardner Murphy are persons of recognized competence in the respective fields of demography, genetics, and psychology. In the first paper, sub-entitled "Present Knowledge Concerning the Effects of Differential Fertility," Dr. Dorn furnishes a brief summary of the nature and extent of class differences in fertility and proceeds to an appraisal of available data concerning the effects.

In the next paper, "A Statement of General Principles and Concepts of Population Genetics," Dr. Snyder explains that for several reasons, particularly because the matings of people cannot be controlled like that of laboratory animals, there are sharp differences between human genetics and animal genetics. This hold true not only with respect to methods of study but also with respect to the concepts that are invoked. The author summarizes the chief principles of human or population genetics and discusses the selective role of differential fertility and assortative mating.

In the last paper, "A Review of Relevant Research on the Inheritance of Mental Traits," Dr. Murphy discusses the trend of research on inheritance of learning abilities and emotional dispositions of animal and human subjects. He offers some suggestions for further research on the relation of differential fertility to the intellectual and temperamental attributes of our population.

The series of articles under the general title "Social and Psychological Factors Affecting Fertility" is continued in this issue. These studies are based upon a large mass of intensive data collected in Indianapolis from a group of native-white married couples meeting certain requirements for eligibility for the Study. The sixth report in this series, published in the January, 1947 *Quarterly,* presented a classification of the couples by "fertility planning" status. In the seventh article, "The Interrelationship of Marital Adjustment, Fertility Control, and Size of Family," Mr. Robert B. Reed analyzes the replies of wives and husbands in various fertility and fertility-planning classes to several questions bearing upon marital adjustment.

NUTRITION IN THE UKRAINIAN S.S.R.[1]

WILLIAM P. FORREST, D.P.H.[2]

THIS short account of the nutritional position in the Ukraine is based upon seven months' personal experience and observation, interviews with officials, Government reports to the UNRRA Mission, and the observations of other members of the Mission, including agricultural economists, supply officers, etc. I lay no claim to exhaustive or complete knowledge but I believe that this constitutes a fairly comprehensive and unbiased picture of the true state of affairs.

THE BACKGROUND

The Ukraine is the historic granary of Russia, the soil is very rich and almost everyone has heard of the famous Ukrainian "black earth." The population is about 40,000,000, of which about 13,000,000 is urban. In 1940 agriculture was collectivized and probably about 50 per cent mechanized on the well-known Soviet plan. The Germans and their Rumanian allies occupied the Ukraine in its entirety for two years. The destruction of equipment, livestock, and farm buildings was enormous. For example, in 1940, on the 28,000 Collective Farms, there were 90,000 tractors; in 1945, after some replacements, there were only 34,000; in 1940 there were 31,000 combines and in 1945 only 7,000; 2,800,000 horses were lost.

Until now, the worst nutritional condition was in the period immediately after liberation, when transport was in its poorest state of disorganization and at the same time had to carry military traffic. Large numbers of refugees and repatriates were moving about and the machinery of distribution was not yet reorganized. Agriculture was being slowly restarted almost entirely by hand and in the most adverse conditions. On the heels of the victorious Red Army, the evacuated Kolkhozniks (collective farmers) were returning to their wrecked farms with

[1] A report prepared in March, 1947, for the United Nations.

[2] Chief Medical Officer, UNRRA Mission to the Ukraine.

their few animals. The flocks and herds were decimated or nonexistent. I am told that, at this stage, there was surprisingly little clinical starvation. This may be partly due to the lack of trained observers since the Ukrainian medical profession had been evacuated, murdered, or carried off into bondage; and also because quite an amount of army food was still available. However, the incidence of tuberculosis, nervous and skin diseases of probable avitaminotic origin, and stunted growth of children, tells its own story of starvation conditions.

In 1945, a fair crop was obtained in the face of the greatest difficulties. This was supplemented by Lend Lease supplies which were then still available. Repatriation of countless thousands of Ukrainians from their bondage in Germany had only commenced.

Recent Experience

In July, 1946, I failed to note any evidence of active malnutrition but many children were small for their age and adolescent males looked rather puny. Good observation was easy since the Ukrainians are zealous frequenters of the bathing beaches on the rivers and seacoast. Few or no skin or eye conditions possibly attributable to malnutrition were noted. The females seemed less affected than the males, but in the Ukraine

Table 1. Amounts of foods (tons) supplied to population of the Ukraine, January–June, 1946.

Type of Food	Delivered by UNRRA Before July 1, 1946	Distributed by Govt. Before July 1, 1946
Meat (All Varieties)	45,000	23,700
Fish (Herring, Cod)	8,000	2,500
Milk (Evaporated and Dried)	24,000	6,200
Cheese	3,500	2,100
Fats (Including Lard and Stabilized Butter)	14,000	4,400
Army Rations (U.S. Balanced C.K. and 10 in 1)	31,000	13,500
Miscellaneous (Some Prepared Cereals, Cocoa)	5,000	12,000
Approximate Total	130,500	64,400

females are usually of stronger build relative to the males, so true comparisons are not easy. At this time the medical profession stated that conditions directly due to malnutrition were insignificant. The State was taking active measures with high caloric feeding of children, special children's kitchens, etc., to make sure that everything possible was being done to prevent any such conditions and to attempt some repair of present ravages from the previous years. There is no doubt that the imports of meats and fats from UNRRA during the six months January–June, 1946 had a great deal to do with this happy state of affairs. Table 1 shows the imports of UNRRA foodstuffs up to and including June, 1946, and the amounts distributed to the people up to July 1, 1946. From this it will be seen that the supplies were spread over so as to be available when UNRRA food imports tailed off, as they were bound to do from August, 1946, onwards. Observations in most parts of the Ukraine have shown that virtually all meat, fish, fat, and milk in ration stores were of UNRRA origin.

Table 2 shows estimated local figures (official documents) of fat consumption. UNRRA supplied 19,000 tons animal fat and 15,000 tons vegetable fat in 1946; Lend Lease supplied 12,500 tons animal fat in 1945. Total imports 1945–1946 were, therefore, 46,500 tons. The low fat consumption is clearly shown.

The figures for meat and fish present almost as dismal a picture: in 1940, per head consumption was at the rate of about 40 kg. per annum. In 1945 it had fallen to 13.5 kg. and it is now not over one-half of that latter low figure.

These UNRRA products were distributed to the urban population only, since the rural populace is regarded as self-supporting in food and therefore is excluded from the central rationed distribution. In times when there are no crop failures this is a reasonable assumption. The few cereals imported were for young children.

With the above-mentioned falling off in UNRRA shipments, which started in September, 1946, as a result of exhaustion of the food budget for the Ukraine, and, to a lesser extent, diffi-

culties of procurement, a change for the worse became apparent. At the same time the effects of the bad harvest began to make themselves felt.

The Poor Harvest of 1946. The soil was prepared and the crops sown under the greatest difficulties due to lack of equipment, draught-power (animal or mechanical), and man-power, which latter was at least 60–70 per cent woman-power. Despite these enormous drawbacks, over 80 per cent of the 1940 acreage was planted. This must be accounted a very notable feat. In addition, by the end of 1946, largely due to the efforts of the rural population itself, with some material assistance from the Government, no less than 517,000 rural houses, 117,000 productive buildings, and 14,000 cultural buildings, had been built or

Table 2. Official Government figures on fat consumption. (Population: urban 13,000,000; rural 27,000,000.)

	Prewar	1945	1946	1947
	THOUSANDS OF TONS			
1. *Total Consumption Per Annum*				
(a) Animal Fats (Including UNRRA and Lend Lease)	—	87.2	123.4	76.2
(b) Vegetable Oils (Including UNRRA and Lend Lease)	—	79.1	69.0	85.0
Total	—	166.3	192.4	161.2
	KILOGRAMS PER HEAD			
(a) Animal Fats	—	2.19	3.08	1.90
(b) Vegetable Oils	—	1.98	1.72	2.13
All Fats	23	4.17	4.80	4.03
Per Head Per Day in Grams	63.0	11.4	13.4	11.0
	KILOGRAMS PER HEAD PER ANNUM			
2. *Fat Consumption by Urban and Rural Population*				
Animal Fats				
Rural		2.0	3.06	1.89
Urban		2.73	3.13	1.93
Vegetable Fats				
Rural		1.86	1.70	2.11
Urban		2.41	1.78	2.16

rebuilt in the Ukraine (Pravda, Ukraine 12/13/46). Obviously, there has been no lack of effort.

But, in the very summer when a reasonably good crop, for which these courageous people had every right to hope, would have made all the difference between turning the corner from the horrors of war devastation to a steady and deserved improvement in their lot, the greatest drought since 1891 destroyed their prospects. It affected a vast area from Moldavia to the Urals, south to the Kuban and north to Moscow. This was a much more severe drought than the well-publicized ones of 1898 and 1921 and the "black earth" was parched. The crops, burnt by the hot summer sun, had little to draw upon because the snowfall in the winter of 1945–1946 had been poor. So, the high hopes withered with the wheat. Hopes were then pinned on the potato crop from Collective Farms and, a wartime phenomenon in the U.S.S.R., the allotments around the towns and cities. But here too, disaster came in the shape of a hot wind out of Asia which dried the plants and the tubers were tiny.

During all this time the livestock was being slowly and laboriously built up from gifts from the rest of the Union, by levies on Germany, and by natural increment. Meat was very scarce since no one was willing to slaughter such assets. Cows used for draught purposes gave very little milk.

There is an agricultural dilemma in the Ukraine which a good harvest would have gone far to break. Although extensive and continual demobilizations have been taking place, there is a great shortage of labor on the under-powered farms. If manpower is taken from the farms to help produce the machinery necessary to liberate more men from the land, there may not be enough men left on the land to produce sufficient food to nourish the factory workers. The poor harvest has aggravated this vicious circle.

The crop cannot, at the most optimistic estimate, be put at much more than 40 per cent of 1940 in cereals and vegetables per acre sown. There is no fodder for the jealously guarded animals (shelter for them is also scarce since the people are

only now moving out of dugouts). Therefore, the small supply of dairy products and meat will soon disappear since animals are being slaughtered. This bodes ill for the autumn of 1947. These supplies would have been earmarked for the vulnerable groups, mothers and children, who are so well cared for under the Soviet regime. It looks as though they are going to have a poor larder. At the time of writing, such supplies are virtually disappearing.

As a final word on this dismal picture, the animal and artificial manures available are very inadequate.

Distribution of Food

I will now attempt to give a picture of the Soviet rations and the actual amounts of food obtained by the consumer.

The population is over 40,000,000, of which 13,000,000 are urban and 27,000,000 are rural. The country, therefore, is comparable to France.

Rural Population. The rural population is normally regarded as self-supporting. Directives are issued to the Rural Soviets (councils) regarding the provision of priority supplies for mothers and children, hospitals, maternity homes, and certain special groups. Technicians, doctors, etc., are accorded certain special privileges and are issued cards from their own organizations. These cards are honored by the Soviet from its own supplies or by the local cooperative store.

Urban Population. The system used is highly differentiated into many categories. "Points" are not used. The cards are issued monthly and are negotiable only by the person named or his family and are "tied" to one store or group of stores. The stores are controlled by the Trust which runs the particular factory involved (O.R.S. Stores) or by the Republican Trade Organizations. Hospitals and institutions are supplied directly from the nearest "base" (Regional Warehouse). Up to October 1, 1946 there was a "favored area" plan to raise morale in cities most affected by the war, whereby Kiev, Lvov, and certain Donbas cities were supplied with sufficient food to enable the giving of a card to everyone whether working or not. This has

	Meat	Fish	Milk	Cheese	Fats A. & V.	Army Rations	Per Cent of All Food
Total	65,465	15,176	19,041	4,216	45,339	23,800	100
Distributed Through Ration Cards	43,334	9,329	11,735	2,454	35,103	23,800	55
Communal Feeding (Including Invalids and Health Resorts)	15,109	4,943	4,210	530	6,960	—	35
Hospitals, Children's Homes, etc. (Including Special Children's Projects, Nurseries, Sanatoria, Dairy Kitchens, etc.)	7,022	904	3,096	1,232	3,276	—	10

Table 3. Amounts (tons) of different types of UNRRA foods distributed to various groups in the Ukraine up to November 1, 1946.

been discontinued. The ration scales are drawn up after taking into consideration the supply position and advice from the Institute of Nutrition which is a part of the Health Service. All UNRRA foodstuffs were equated with the system by this Institute and all were sold only in ration stores or distributed free to state institutions as shown in Table 3.

In all cases the products were sent where they should have gone; for example, childrens' institutions received a larger share of evaporated and liquid milk and fruit juices.

Table 4 shows the food actually planned for on the official ration scales. At all times these were subject to shortages and substitutions. The substitutions were skilfully carried out on proper recommendations of the Institute of Nutrition, *e.g.*, peanuts were substituted according to their actual fat content.

Expectant and nursing mothers (Category VI) receive a special supplemenary ration on production of a certificate from a "Woman's Consultation." This special ration is to be added to their normal ration shown below. Most Soviet mothers worked or because of special childrens' allowances or high family sal-

aries were quite well able to supplement their dietary in the markets or Gastronoms. Every effort is made to cater for them while working. They receive six weeks' to two months' leave with pay, have nurseries for infants, etc.

Supplementary rations per month for expectant and nursing

Table 4. Ration scales in force up to September 30, 1946, for various categories[1] in the population.

Commodity	I Worker in Heavy Industry	II Worker in Light Industry	III Employe	IV Dependent (See Definition)	V Children up to 14
	Kilograms per month (30 days)				
Bread	36.0	18.0	12.0	9.0	12.0
Cereals	2.0	1.2	0.8	0.6	0.8
Meat or Fish	3.2	1.8	1.2	0.5	0.4
Fats	0.9	0.4	0.3	0.2	0.3
Sugar	0.5	0.4	0.3	0.2	0.3
Potatoes	5.0	Nil	Nil	Nil	Nil
Vegetables	3.0	Nil	Nil	Nil	2.0
Butter (or Substitute)	Nil	Nil	Nil	Nil	60 gms.
Fresh Milk (or Substitute)	Nil	Nil	Nil	Nil	9.0
Vitamin Juices	Nil	Nil	Nil	Nil	Sufficient
	Daily calories from rations				
Total	3,888	1,916	1,294	913	1,415
Protein	487	246	164	98	177
Fat	622	308	216	133	264
Carbohydrate	2,779	1,362	914	682	974

[1] Definitions of categories:

I. *Heavy Industry:* Moulders, smelters, riveters, certain stakhanovites and underground workers such as miners. The latter often receive a heavy meal before going on shift.

II. *Light Industry:* Railwaymen, machine tool operatives.

III. *Employes:* Office workers, caretakers, timekeepers, etc.

IV. *Dependents:* At this time meant men over 45 not working, women over 45 with no children under 14 and not working; *i.e.*, all men under 45 and "childless" women under 45 had to work to have a card.

V. *Children up to 14:* This does not include extra rations, which may be received in children's institutions, *e.g.*, day nurseries.

VI. *Expectant and Nursing Mothers:* From third month of pregnancy until child is one year old. Certificates are issued by the "Woman's Consultations" (Maternal Welfare Centers) and "Children's Consulations" (Child Welfare Centers), just as in Britain, but they usually can be obtained only at such centers and nowhere else. (*See* text).

mothers include: cereals 1.2 kg.; butter (or substitute fat) 0.8 kg.; sugar 0.6 kg.; vegetables 2.0 kg.; milk (or dried milk to make) 12.0 liters. From rations only, the total daily calories according to category are:

II	1,916	plus 745 = 2,661	(Protein	321	Fat	709	C.H.	1,631)
III	1,294	plus 745 = 2,039	("	239	"	617	"	1,183)
IV	913	plus 745 = 1,658	("	173	"	534	"	951)

It should be noted that over 95 per cent of all infants are breast fed by their mothers, who are encouraged to nurse them up to the age of at least one year. It will also be seen that the provision of milk products fell well below the rather low League of Nations standards. They received ample supplies of fruit juices (UNRRA) until about the end of October. Children often received up to 60–80 grams of butter per month in schools, etc.

Table 5. Price changes in the Ukraine in October, 1946. All values are expressed in kilograms (1 kg. = 2.2 lb.) and only those items which changed are shown.

Item	Ration Prices[1]		
	New	Old	Per Cent Increase
Bread (Black with Rye)	3.2	0.9	255
Bread (Whole Wheat)	6.0	1.8	240
Meat Tushonka	32.0	16.6	87
Pork Meat in Gravy	35.3	20.5	72
Meat and Vegetables	15.3	10.0	53
Pork and Rice	30.7	15.7	90
Meat and Corn	17.7	10.0	77
Herrings in Tomato	25.0	11.5	117
Herrings in Natural Oil	37.5	17.2	118
Cod Smoked	18.0	9.8	84
Lard	36.0	18.0	100

[1] At the same time commercial store prices decreased although not to the same extent.

It cannot be said that with the exception of bread these scales were over-liberal. The bread was about 85 per cent extraction and damp. Some "white" bread about 78 per cent extraction was available at extra cost. The percentage of rye in the bread varied by district. It was wholesome and nourishing. The Soviet citizen is a prodigious consumer of bread.

On October 1, 1946, in consequence of the bad harvest, the Government took steps to conserve what it could. The distribution was restricted by the following means:

1. The definition of "dependents" was altered. Males under 55 were excluded if not working (unless they were invalids). This also diverted more males into the labor pool. Female classes remained unchanged.

2. Cereals and "white" bread disappeared from the commercial stores and soon from the ration stores. They became very scarce in the markets.

3. Prices were altered as shown in Table 5. At the same time, by way of compensation for the lower income groups, wages were adjusted as shown below. In spite of this, hardship was undoubtedly increased even discounting the high children's allowances paid by the State. Prices in Gastronoms and other commercial stores were cut at the same time, but this has little significance.

In addition to these obviously official measures, meat, fish, and fats became scarcer and scarcer as time went by and the extra ration supplies in the markets became more and more scarce and expensive, finnally reaching a price level stability because no one could really afford to buy. Substitutions such as potatoes for sugar increased in frequency.

The compensatory increments to wages announced at the time that these increased prices came into effect were as follows:

Wage	*Increase*
Above 900 roubles per month	Nil
700–900 roubles per month	80 roubles per month
500–700 roubles per month	90 roubles per month
300–500 roubles per month	100 roubles per month
Under 300 roubles per month	110 roubles per month

Nonworking pensioners, members of families of veterans who receive relief and are state-supported received an increment of 60 roubles, high school students 80 roubles, and technical school students 60 roubles.

Thus, there was a differential increase to offset in some measure the increases in prices of rationed foods, but with a large family, especially with dependents, this did not balance.

By the end of December, the only really reliable item was

bread, now blacker but still available, and the food rations approached the scale shown in Table 6. It is not known why the cards were not modified so that the ration shown could be honored which, I think, is the best plan. Probably distribution difficulties have something to do with this.

Rations for high caloric feeding of children at nurseries and kindergartens, the special allocations for mothers and children, hospitals, etc., began to become difficult to maintain and these are always the last categories to be affected in this country.

Table 6. Ration scales per month (30 days) as from February 1, 1947.

Commodity	I Worker in Heavy Industry	II Worker in Light Industry	III Employe	IV Dependent	V Children up to 14
	kilograms[1]				
Bread	36.0	18.0	12.0	7.5	12.0
Cereals	—	—	—	—	(0.8)0
Meat or Fish	(3.2)0	(1.8)0	(1.2)0	—	(0.4)0
Fats	(0.9)0	(0.4)0	(0.3)0	—	(0.3)0
Sugar	(0.5)0	(0.4)0	(0.3)0	—	0.3
Potatoes	(5.0)0	—	—	—	—
Vegetables	(3.0)0	—	—	—	(2.0)0
Butter (or Substitute Fat)	—	—	—	—	60 grams
Fresh Milk (or Substitute)	—	—	—	—	9.0
Vitamin Juices					Scarce
	daily calories—allowing 25 per cent of figures in parentheses, an overestimate				
Total	3,040	1,512	1,010	593	1,067
Protein	357	178	118	67	125
Fat	244	121	82	26	99
Carbohydrate	2,439	1,213	810	500	843

Category VI. Expectant and Nursing Mothers—Calories Per Day According to Class (Their Subsidiary Rations Often Are not Honored):

II 1,512 + 745 = 2,257 (Protein 243 Fat 522 C.H. 1,492)
III 1,010 + 745 = 1,755 (Protein 193 Fat 483 C.H. 1,079)
IV 593 + 745 = 1,338 (Protein 142 Fat 427 C.H. 769)

[1] Figures in parentheses are amounts authorized on cards; 0 not received in practice; – not authorized on card.

In mid-January it was officially admitted that the position was extremely serious, supplies of meats, fish, fats, etc., were at vanishing point and the large-scale slaughter of animals which had taken place in the fall had had its full effects. The price of meat was 68 roubles per kg. in July, 40 in October, and 60–70 in November and December with very small supplies.

It is my opinion that the dietary available to the average ration-card holder became very inadequate from about mid-October. It was often nearly adequate in calories but gravely lacking in meat and fats, and by the end of the year the vulnerable groups were not receiving even the previous by no means adequate ration. This opinion is borne out by the fact that clinical malnutrition had made its appearance in the smaller villages, with protein dropsy and various avitaminoses being exhibited by the villagers. The townspeople now showed increased incidence of respiratory and nasopharyngeal conditions, skin infections, and a considerable lack of their former liveliness, energy, and cheerfulness. It is not admitted here that clinical malnutrition has appeared in the urban population, but I am of opinion that this may be largely a question of definition and that, if it has not, it cannot now be long delayed. It is fairly evident that little worse can befall the populace unless the bread ration cannot be met, since at present this is about all the consumer receives.

On February first, further restrictions were made in the definitions of dependency; a rigid comb-out of persons in all categories was made to do away with false classifications, etc. Female dependents must now be over 55 and dependents' rations have been cut to about what they could receive anyway, *viz.*, 7.5 kgs. bread per month. It is thought by the Government that they can maintain their bread distribution until vegetables will be available, which they say is in May. I think that before vegetables will be available in sufficient quantity to make any significant contribution to the picture, June will be over. Practically all UNRRA products are consumed and little more can be expected from this quarter. It is my opinion

that the distribution of UNRRA foodstuffs has been the fairest, most intelligent, and most equitable of any UNRRA recipient country.

The Markets and Other Sources of Food

I will try to give a picture of the sources of food outside the ration scales. In the first place it should be noted that all fats, whether bought in markets or direct from farms, are included in Table 2. This is a truly appalling level of consumption of fats especially in a country with such severe winter conditions, where poor supplies of clothing, fuel, and shelter are the rule and where hard work is the order of the day so that they may build up something from the wreckage produced by war.

The food available to the average consumer outside the rationing system cannot be accounted as very important. The prices in commercial stores, which do not have a large turnover, are high, usually four to ten times those in ration stores, and they deal usually in the more luxury articles of trade such as smoked fish, confectionery, etc. Sugar, cereals, and the like long ago disappeared from the shelves of these stores.

Open Markets. These are free and derive their supplies from the surplus produce (over that contracted for State Trade Agencies) of Kolkhozes, from individual produce of allotment

Table 7. Food prices at open markets in the Ukraine.

Food	June 1946	July 1946	January 1947
	roubles		
Bread, Kilo	22.5	23.0	50.0–55.0
Meat, Kilo	60.0[1]	70.0–100.0	60.0
Fish, Kilo	—	—	63.0
Milk, Liter	16.0	15.0	16.0
Butter, Kilo	190.0	190.0	230.0
Eggs, Dozen	42.0	48.0	—
Cereals (Various), Kilo	—	50.0[1]	—
Sugar	—	100.0	—
Vegetable Oil	—	200.0	200.0

— Very little or none on sale. Supplies vary greatly but are never very large.

[1] Approximate price.

holders whether Kolkhozniks or not, and similar sources. They also serve as exchanges where persons attempt to exchange surpluses for articles of which they are in greater need, *e.g.*, a woman with many children and a husband who is a heavy worker would want to sell bread and try to buy eggs, butter, meat, etc. Today she meets with little success in her purchases.

The market in which the figures given in Table 7 were obtained is a typical urban open market. The State says where these markets are to be held and collects observations on prices, etc. It exerts, also, a rather poor control on sanitation. The observer was the same in each case and is a native-born Russian who speaks the language fluently.

Recent Special Measures to Protect Health

The Ministry of Care of Health has taken the following steps to meet the medical aspects which may arise out of the present stringent food position:

1. In the districts most affected by the poor crops of 1946, *all* children are to be fed by State feeding centers under the control of the Ministry of Health. Normally the Ministry of Education is in charge of the feeding of some of the school children and other groups are fed, in varying degree, by the Ministry of Health and Trade Union organizations. By these means it is hoped to make sure that children of all ages and population groups will be fed as well as is possible. Transport is one of the limiting factors in this program.

2. Measures are being taken by recruitment and equipment of medical teams, which will be sent to areas where any severe or wide-spread symptoms of starvation conditions show themselves, to make the best use of such palliative measures, *e.g.*, special protein foods, etc., as are available.

The Ministry is of opinion that the three months March–May will be the critical period and this opinion is shared by other official organizations, as can be seen in announcements of these decisions in the newspapers, *e.g.*, the Communist Party (B) of Ukraine, etc. In such announcements the scarcity of food is freely admitted to be greater than in the famous 1922

famine, but it must be remembered that mass distribution, rationing, and control, including the collectivization of agriculture, are in quite a different category, so that the consequences are not likely to be in any way so severe. Epidemics of typhus such as prevailed then are virtually out of the question; the level of artificial and natural immunity and the sanitary services available can be confidently expected to prevent the spread of any small outbreaks that may arise.

Conclusions

1. The country and its agriculture have suffered more severely than any other in Europe, with the possible exception of Byelorussia, which has a much smaller area and population.

2. Considering the destruction of means of production, the country was making a remarkable recovery, and its efforts to this end must command the respectful admiration of all.

3. UNRRA food supplies, although small per capita, made a very significant contribution to this, since the foods imported were those in shortest supply and most necessary to sustain the efforts of the population.

4. Since the disastrous drought, the reduction of indigenous supplies of necessary foods and the cessation of UNRRA imports of such foods, the dietary position of the population, particularly of the vulnerable groups, but also of the working population, cannot fail to give rise to the most profound concern.

5. All supplies available have been most equitably and intelligently distributed.

6. The recovery of the country from the ravages of war has received a severe setback through the bad harvest and the consequent dangerously low level of nutrition, which will make it difficult, if not impossible, for these courageous people to continue their efforts to rehabilitate themselves.

7. The cessation of Relief supplies of meats, fish, milk, and fats at this time is nothing less than a tragedy.

8. The position will not improve until the autumn of this year. It will deteriorate.

CHRONIC DISEASE AMONG SPOUSES[1]

JEAN DOWNES

THE leading position of the chronic diseases as causes of disability and death has served in recent years to broaden the scope of public health activities. In some localities the program now includes preventive and therapeutic measures for the control of the crippling effects and early fatality of conditions such as cancer, diabetes, and heart disease. But a comprehensive program of control and alleviation of chronic conditions requires more knowledge than is now available of particular diseases and their causes.

This need for more knowledge of chronic conditions has been described by Ryle in a letter to *The Lancet:*[2] "More intimate socio-medical investigations of all the prevailing chronic diseases of our age are now needed. The 'multiple stress' diseases and accidental injuries in the western world are as worthy of epidemiological inquiry as the diseases due to infective agents. They now cause more loss of life and efficiency and call for a greater expenditure of time and money than the communicable diseases. Like these they are due to a complexity of causes which vary with time and place and social change and which can, by appropriate methods, be unravelled. Unlike them they lack a specific factor which can sometimes be specifically countered. But social conditions and modes of work and habits are—albeit slowly—alterable things."

To learn more about the chronic diseases was the major objective of a study of morbidity carried on in the Eastern Health District of Baltimore from June, 1938, to May, 1943. Since the population of the study consisted of family units, it was possible to observe the prevalence of conditions which are usually nonfatal, as well as those which are among the

[1] From the Milbank Memorial Fund and The Division of Public Health Methods of the United States Public Health Service.

[2] Ryle, John A.: Coronary Disease. *The Lancet,* No. XIX of Vol. II, 1946, pp. 692–693.

leading causes of death in a group of adults composed of husbands and their wives. Accordingly, this particular report presents an analysis of the prevalence and incidence of chronic disease and the association of specific chronic conditions among a sample of married pairs. Husbands and their wives constitute a unique group in this study because it was possible to observe the event of chronic disease in young, middle-age, and old-age couples who had shared the same environment over varying periods of years.

A previous study has indicated an association in age at death and cause of death of husbands and wives. In an analysis of the causes of death among a sample of 2,571 husbands and wives who died in Washington County, Maryland, during the period 1898 to 1938, Ciocco found a tendency for husbands and wives to die from the same cause when one spouse died from either tuberculosis, influenza and pneumonia, heart disease, or cancer.[3] This tendency was most striking relative to tuberculosis and was statistically significant with respect to all four causes. Ciocco was inclined to explain the association observed with respect to age at death and causes of death as probably due to conscious or unconscious marital selection and to spread of infection in a closely shared environment.

Preliminary analysis of illness in the chronic-disease families in the Eastern Health District indicated that members of families selected on the basis of a case of chronic disease had an excess rate of illness compared with the remaining population.[4] This was true for both chronic-disease patients and for other members of the family. A consideration of factors of the social environment, such as occupational class of the household head and the amount of medical care in relation to the amount of illness, aside from chronic disease, revealed no striking differences between the two groups of families. A study of chronic disease among husbands and wives in these families offers an

[3] Ciocco, Antonio: On the Mortality in Husbands and Wives. *Human Biology*, 12: No. 4, December, 1940.

[4] Downes, Jean: Illness in the Chronic Disease Family. *American Journal of Public Health*, 32: No. 6, June, 1942.

additional way of finding out whether such conditions tend to be concentrated in certain families.

Data and Method of Study

The method of sampling in the study in the Eastern Health District has been described in detail in a previous report.[5] It is sufficient here to say that the white families living in thirty-five square blocks formed the sample population. The plan of the study was to follow families that lived in a group of houses in certain blocks rather than to follow a selected group of families. No attempt was made to continue visiting families that moved out of these houses during the period of study, but the new families that moved into the houses vacated were included in the study. Monthly visiting was initiated in this study in order to obtain accurate reports of illness. The record of illness started with the first visit to the family.

To obtain an accurate and complete picture of the extent of chronic disease or affections in an observed population was one of the particular concerns of the study in the Eastern Health District. At the time of the first visit to the family an effort was made to record all diseases of a chronic nature among the present members of each household, whether or not they were causing present disability. Careful inquiry was made also concerning members of the family at that time resident in institutions for the mentally ill, for the feeble-minded, for the tuberculous, and for other chronic diseases requiring institutional care.[6]

All deaths which had occurred in the family since its establishment were recorded and the cause and date of death were specified. This made it possible to know how many members of the family died of diseases which are generally of a chronic nature.

[5] Downes, Jean and Collins, Selwyn D.: A Study of Illness Among Families in the Eastern Health District of Baltimore. The Milbank Memorial Fund *Quarterly*, xviii, No. 1, January, 1940.

[6] These records are considered as reasonably complete because, for each family, information was obtained concerning all nonresident members of the household. Thus, those in institutions were recorded along with others not living at home.

Special information was obtained for all chronic diseases. This information included data concerning the onset of the first symptoms of the disease, their nature and date, the date first diagnosed, and whether or not the diagnosis was made by a private physician, at a clinic, or at a hospital.[7] Such a record made it possible to observe the prevalence of chronic disease at first observation of the family, and the occurrence of new cases which were manifest by illness sufficiently severe to obtain a diagnosis.

The Sample

The sample reported upon in this particular analysis was composed of husbands and wives in all family units observed for illness for at least twelve consecutive months during the period June, 1938–May, 1941. The longest possible period of observation was thirty-six months; the shortest period was twelve months.

In an unselected sample of family units there is variation as to type of unit, that is, with respect to its make-up. The simple family unit consists of the husband, or head of the household, and his wife and their children. Some family units are more complex. In addition to the simple unit, the family may include one or both parents of either the husband or wife, or married sons or daughters of the husband and wife. In the study in the Eastern Health District of Baltimore a record of previous marriages was obtained for both the husband, or head of the household, and his wife, but a record of previous marriages was not obtained for other married or widowed persons living in the household.

In the family units comprising the study there was a total of 1,773 married pairs, including widowed, or those represented by only one spouse. For 255 of these, it was unknown as to whether either the husband or the wife had had a previous

[7] The causes of illness as reported by the family informants were submitted to the attending physicians for confirmation or correction. The causes of illness for clinic attendance and hospital admissions were also checked against the records of the clinic or hospital where the service was given.

Age Group	Total Married Pairs	A Second Marriage for Either Husband or Wife or For Both	Per Cent of Pairs With a Spouse Married More Than Once
Total	1,488	199	13.4
20–34	427	37	8.7
35–44	372	50	13.4
45–64	561	87	15.5
65+	128	25	19.5

Table 1. Per cent of pairs with a spouse married more than once.

marriage. This group of 255 included young married sons or daughters of the head of the household and parents of either the household head or his wife. These were excluded from the analysis because of an incomplete marriage history. An additional 30 pairs (married once only) had to be excluded from the analysis since information concerning present chronic illness was available for only one member of the pair because of divorce or separation from the spouse.

In 199 of the remaining 1,488 married pairs, either the husband or the wife, or both, had had a previous marriage.[8] Table 1 shows the 1,488 married pairs arrayed according to the age of the husband, and the per cent in each age group that were second marriages. The proportion of second marriages among married pairs increased with age. At ages 20–34 in almost 9 per cent of the pairs one or both spouses had had more than one marriage and at ages 65 and over, 20 per cent were in this class.

To study the association of chronic illness in husbands and wives it was considered essential to eliminate these pairs where there had been more than one marriage on the part of either one or both of the spouses chiefly because, in the study of illness in the Eastern Health District of Baltimore, specific information concerning chronic illness was not obtained for spouses of previous marriages.

[8] In a total of 199 pairs there had been a previous marriage; in 114 only the wife had been married more than once; in 48 only the husband had had a previous marriage; in 37 instances both the husband and the wife had been married more than once.

In all, 484 married pairs were excluded from the study of chronic illness for the reasons which have been described. Among the remaining 1,289 married pairs (one marriage only) there were 150 widows and 30 widowers. Thus it is possible to study chronic disease for 1,109 pairs where both husband and wife were living, and for the 1,289 pairs including those where one member was deceased at the time the family unit was first observed.

Economic Background

As far as the white population is concerned the Eastern Health District of Baltimore was considered as fairly representative of the localities in the city in which the wage-earning population lived; that is, it contained some families in relatively poor economic circumstances, wage-earning families in moderate circumstances, relatively few families in the professional class, and no families that could be classed as wealthy. The district cannot be considered as strictly representative of Baltimore as a whole, but it is probably representative of the population which forms the great majority in the City.

Table 2 shows the distribution of the 1,289 pairs, married

Table 2. Percentage distribution of 1,289 married pairs according to home ownership and by age of husband (married once only).

Age of Husband	Total	Home Owner	Renter
	per cent		
All Ages	100.0	55.9	44.1
20–34	100.0	27.9	72.1
35–44	100.0	59.0	41.0
45–64	100.0	71.2	28.8
65 +	100.0	82.4	17.6
	number of married pairs		
All Ages	1,289	721	568
20–34	390	109	281
35–44	322	190	132
45–64	474	337	137
65 +	103	85	18

Age of Husband	Mean Rent	Standard Error of Mean	Standard Deviation
20–34	$22.78	±0.42	±6.94
35–44	$23.20	±0.74	±8.47
45–64	$24.41	±0.82	±9.41
65+	$21.93	±1.74	±7.38

Table 3. Mean amount of rent per month for 568 married pairs (married once only).

once only, with respect to home ownership and according to age of the husband. Home ownership increased with the age of the husband. At ages 20–34, 28 per cent of the married pairs owned their homes and at ages 65 and over, 82 per cent were home owners. The proportion who rented their homes showed a corresponding decrease with age; at ages 20–34, 72 per cent rented their homes and only 18 per cent, where the husband was 65 years of age or over, lived in rented homes.

The mean value of owned homes was $2,712 ± 43.39, with a standard deviation of $1,110.29. Table 3 shows the mean amount of rent per month for married pairs at different ages. The variation in mean rents with age of husband was slight; from about $22 per month at age 65 and over, to $24.41 at ages 45–64. It may be concluded that the married pairs in this study were living in an area where owned homes were moderate in valuation and rentals were also moderate.

Prevalence and Incidence of Chronic Disease

Since this study is concerned with chronic disease among married pairs, it is of interest to indicate the general period of time that the spouses had shared the same environment. Table 4 shows the mean years of married life for the 1,289 pairs who had had one marriage only. Husbands at ages 20–34 had been married an average of six years, at ages 35–44 the majority had been married from 10 to 20 years, at ages 45–64 from 20 to 34 years, and for husbands at ages 65 and over, the mean years of married life was about 41.

Before considering either the prevalence or incidence of

Age of Husband at Time of First Visit to Family	Mean Years of Married Life	Error of Mean	Standard Deviation
20–34	5.90	±0.19	±3.67
35–44	15.68	±0.29	±5.27
45–64	27.35	±0.32	±6.93
65+	40.87	±0.95	±9.90

Table 4. Mean years married for 1,289 pairs (married once only).

chronic disease among these married pairs, it is necessary to define what is meant by chronic disease. The term "chronic disease" usually includes those diseases or affections which have as a common characteristic a relatively long duration in time, in contrast to the term "acute" which denotes short duration. In this study the diseases or affections which have been selected for special consideration are as follows: tuberculosis, malignant neoplasms, diabetes, psychoses, psychoneuroses, heart disease, hypertensive vascular disease, varicose veins, ulcer of the stomach or duodenum, gall-bladder disease, chronic nephritis, arthritis, hernia, and asthma.

To study the total prevalence of chronic illness among married pairs it was considered important to include the 1,289 husbands and their wives; that is, the 1,109 pairs where both husband and wife were living, plus the 180 pairs where one spouse was deceased. These latter were included even though chronic conditions of the dead spouses were known only if they were causes of death. However, inclusion of these cases pre-

Table 5. Per cent of pairs with one spouse deceased.

Age Group	Total Married Pairs (Married Once Only)	Number With One Spouse Deceased	Per Cent With One Spouse Deceased
Total	1,289	180	14.0
20–34	390	13	3.3
35–44	322	27	8.4
45–64	474	97	20.5
65+	103	43	41.7

sents a more complete record than that based on living pairs which selects couples at older ages on the basis of survival and, therefore, relative freedom from the more fatal chronic diseases. This fact is illustrated by the data shown in Table 5.

Prevalence rates for the living pairs and for living pairs plus those with one spouse dead are shown in Table 6. When living pairs only are considered, the per cent of persons with chronic illness was slightly higher among wives than among husbands, except at ages 35–44, where both had similar rates. However, when the widows and widowers with their dead spouses are included, the difference between the sexes is reversed. None of the differences between the sexes are statistically significant. This table also shows a marked increase in chronic disease with age for both husbands and their wives.

Table 6. Per cent of husbands and wives with chronic disease (1,289 pairs).

Age of Husband	Husbands	Wives
	Rate Per 100	
All Ages		
Living Only[1]	11.6	13.5
Living and Dead[2]	17.8	16.9
20–34		
Living Only	2.9	3.4
Living and Dead	4.1	3.6
35–44		
Living Only	8.5	8.5
Living and Dead	12.1	10.6
45–64		
Living Only	19.1	23.9
Living and Dead	27.4	26.4
65 and Over		
Living Only	35.0	36.7
Living and Dead	42.7	43.7

[1] "Living only" includes 1,109 pairs where both husband and wife were living at the time of first observation.
[2] "Living and dead" includes the 1,109 pairs plus the 180 pairs where one spouse was deceased at the time of first observation.

The incidence of new cases of chronic disease among spouses is shown in Table 7 for the 1,109 living pairs. Those who had chronic disease at the beginning of observation have been excluded. It should be pointed out again that the shortest period during which new cases of chronic disease could occur was one year, and the longest period three years. The total years of observation for all pairs was 2,747. For all age groups combined, the incidence of new cases, 2.5 per 100 wives, was 25 per

Age of Husband	Population	New Cases		Rate Per 100 Per Year	
		Husbands	Wives	Husbands	Wives
All Ages	2,747	55	69	2.00	2.51
20–34	823	8	16	0.97	1.94
35–44	760	14	6	1.84	0.79
45–64	998	26	35	2.61	3.51
65 +	166	7	12	4.22	7.23

Table 7. Annual incidence of chronic disease among 1,109 living pairs (married once only).

cent higher than that among husbands. Among both husbands and wives the incidence was relatively low under age 45 and increased in middle and old age. The increase was more marked for wives than for husbands.

Chronic Disease by Cause Among Husbands and Wives

Preliminary to the discussion of specific kinds of chronic disease among husbands and wives, it is suitable to point out that among living spouses only cases diagnosed by a private physician, clinic, or hospital are included. Cases "self-diagnosed" were reported very infrequently in this study and these were excluded. In the category "hypertensive vascular disease" among wives, cases of high blood pressure associated with the menopause were excluded if so stated by the attending physician. Among both husbands and wives the category "varicose veins" included only cases which caused illness or some disability or required some medical care. "Arthritis" includes rheumatoid arthritis, osteoarthritis, and other degenerative arthritis. "Psychoneuroses" includes only cases with complaint of physical symptoms for which psychneurosis or neurosis was the sole diagnosis made by the physician. Psychoses include: alcoholic psychosis, dementia praecox, manicdepressive, senile dementia, and involutional melancholia.

In some instances either a husband or a wife had more than one chronic condition. For example, arthritis and hypertensive vascular disease may have been present in the same person.

In Appendix Table 1, all cases of the various chronic diseases are shown for living pairs by age of husband. Appendix Table 2 shows data for certain chronic diseases among both groups of spouses, living and dead.

The rate of prevalence of chronic disease by specific cause is shown in Table 8 for the 1,109 husbands and their wives living at the time of observation. There was a higher prevalence of tuberculosis, malignant neoplasms, psychoses, and hernia among husbands than among their wives. Ulcer of the stomach and duodenum occurred among husbands only. For all other causes of illness, the rates were higher among wives than among

Table 8. Prevalence of chronic disease by cause among husbands and wives at different ages (rate per 1,000 population).

Classification of Chronic Disease	All Ages (1,109 Pairs)	20–34 (377 Pairs)	35–44 (295 Pairs)	45–64 (377 Pairs)	65 + (60 Pairs)
		Age Groups			
Tuberculosis					
Both Husband and Wife	0	0	0	0	0
Husband Only	9.9	2.6	10.2	15.9	16.7
Wife Only	3.6	8.0	0	2.6	0
Neoplasm (Malignant)					
Both Husband and Wife	0	0	0	0	0
Husband Only	6.3	0	0	13.3	33.3
Wife Only	4.5	0	0	8.0	33.3
Diabetes					
Both Husband and Wife	1.8	0	0	5.3	0
Husband Only	4.5	0	6.8	8.0	0
Wife Only	9.0	0	3.4	21.2	16.7
Psychoses					
Both Husband and Wife	0.9	0	0	2.6	0
Husband Only	5.4	5.3	6.8	5.3	0
Wife Only	3.6	0	3.4	8.0	0
Psychoneuroses					
Both Husband and Wife	0.9	0	0	2.6	0
Husband Only	6.3	8.0	10.2	0	16.7
Wife Only	22.5	21.2	27.1	21.2	16.7
Circulatory Disease[3]					
Both Husband and Wife	17.1	0	0	29.2	133.3
Husband Only	43.3	8.0	23.7	74.3	166.7
Wife Only	59.5	15.9	23.7	108.8	200.0

Table 8—Continued

Classification of Chronic Disease	All Ages (1,109 Pairs)	20–34 (377 Pairs)	35–44 (295 Pairs)	45–64 (377 Pairs)	65 + (60 Pairs)
		Age Groups			
Heart Disease					
Both Husband and Wife	5.4	0	0	8.0	50.0
Husband Only	37.0	5.3	13.6	66.3	166.7
Wife Only	41.5	10.6	16.9	69.0	183.3
Hypertensive Vascular Disease					
Both Husband and Wife	3.6	0	0	8.0	16.7
Husband Only	14.4	2.6	10.2	21.2	66.7
Wife Only	26.1	5.3	6.8	53.0	83.3
Varicose Veins					
Both Husband and Wife	0	0	0	0	0
Husband Only	4.5	0	6.8	5.3	16.7
Wife Only	17.1	0	13.6	29.2	66.7
Ulcer of Stomach and Duodenum					
Both Husband and Wife	0	0	0	0	0
Husband Only	8.1	10.6	10.2	5.3	0
Wife Only	0	0	0	0	0
Gall-Bladder Disease					
Both Husband and Wife	0	0	0	0	0
Husband Only	1.8	0	3.4	2.6	0
Wife Only	21.6	10.6	13.6	34.5	50.0
Nephritis					
Both Husband and Wife	0	0	0	0	0
Husband Only	0	0	0	0	0
Wife Only	0.9	0	0	2.6	0
Arthritis					
Both Husband and Wife	9.0	0	3.4	23.9	0
Husband Only	25.2	2.6	30.5	37.1	66.7
Wife Only	52.3	10.6	23.7	87.5	233.3
Hernia					
Both Husband and Wife	0	0	0	0	0
Husband Only	27.0	2.6	20.3	45.1	100.0
Wife Only	5.4	2.6	0	13.3	0
Asthma					
Both Husband and Wife	0	0	0	0	0
Husband Only	9.9	2.6	10.2	13.3	33.3
Wife Only	9.9	2.6	13.6	13.3	16.7

[1] Includes only heart disease and hypertensive vascular disease.

husbands with the exception of asthma where the rates were the same for both groups. In the case of both husbands and wives chronic illness was concentrated chiefly among those aged 45 and over. However, the rate of psychoneurosis among wives showed little variation with age.

Among these living pairs, there was no instance where active tuberculosis was known to be present in both husband and wife. The same was true for malignant neoplasms, varicose veins, ulcer of the stomach and duodenum, gall-bladder disease, nephritis, hernia, and asthma. In two instances diabetes was

Table 9. Prevalence of chronic disease by cause among husbands and wives at different ages (both husband and wife married once only—includes widowed).

Classification of Chronic Disease	Total (1,289 Pairs)	20–34 (390 Pairs)	35–44 (322 Pairs)	45–64 (474 Pairs)	65+ (103 Pairs)
	Rate Per 1,000 Population				
Tuberculosis					
Both Husband and Wife	0	0	0	0	0
Husband Only	13.2	5.1	12.4	21.1	9.7
Wife Only	4.7	7.7	0	6.3	0
Neoplasm (Malignant)					
Both Husband and Wife	0.8	0	0	0	9.7
Husband Only	19.4	0	9.3	40.1	29.1
Wife Only	9.3	0	3.1	14.8	38.8
Diabetes					
Both Husband and Wife	1.6	0	0	4.2	0
Husband Only	7.2	2.6	9.3	8.4	0
Wife Only	14.0	0	9.3	19.0	58.3
Circulatory Disease					
Both Husband and Wife	27.2	0	3.1	42.2	135.9
Husband Only	71.4	12.8	37.3	109.7	223.3
Wife Only	68.3	17.9	31.1	111.8	174.8
Heart Disease					
Both Husband and Wife	11.6	0	0	16.9	68.0
Husband Only	68.3	10.3	31.1	105.5	233.0
Wife Only	49.7	10.3	24.8	78.1	145.6
Hypertensive Vascular Disease					
Both Husband and Wife	3.9	0	0	8.4	9.7
Husband Only	14.7	2.6	9.3	21.1	48.5
Wife Only	30.3	7.7	9.3	50.6	87.4

present in both husband and wife; in one instance both husband and wife were diagnosed as psychotic; also in one instance both were considered as psychoneurotic. Heart disease, hypertensive vascular disease, and arthritis occurred in both members of a pair with greater frequency than was noted for other chronic diseases.

Table 9 shows for the total 1,289 pairs, including the widowed and their spouses, the prevalence of the specific chronic diseases which are leading causes of death. Inclusion of the spouses where one member of the pair was deceased affects chiefly the prevalence of malignant neoplasm and heart diseases. For example, the rate of malignant neoplasm among males was more than three times as great as the rate noted where both spouses were living, and the rate among females was more than doubled. Males suffered more frequently from these conditions than did females, especially in the middle and old-age group.

Inclusion of the widowed and the deceased spouses did not have such a marked effect upon the rates for diabetes except for females where the prevalence was 44 per cent above that based only upon the living pairs. Slighter changes were noted for tuberculosis and hypertensive vascular disease.

It is interesting to note that the sex distribution of chronic disease by cause in this study is in general agreement with medical experience. For example, in medical experience diabetes has been noted to be less common among males than among females, especially after age 40.[9] This was true in the living married pairs studied in the Eastern Health District. Also, both rheumatoid and degenerative arthritis have been noted to occur more frequently among women than among men.[10, 11] In this study the prevalence of arthritis among wives (both husband and wife living) was 61 per 1,000, compared with a rate of 34

[9] Duncan, Garfield G.: Diseases of Metabolism: Detailed Methods of Diagnosis and Treatment. A Text for the Practitioner. Philadelphia, W. B. Saunders Company, 1942. (p. 708.)

[10] Cecil, Russell L.: A Textbook of Medicine by American Authors. Philadelphia, W. B. Saunders Company, 1943, 6th ed. (p. 765.)

[11] Musser, John H.: Internal Medicine: Its Theory and Practice. Philadelphia, W. B. Saunders Company, 1938, 3rd ed.

among husbands.[12] Also, ulcer of the stomach and duodenum has been found to occur more frequently among males than females. This again corresponds with data from this study. The percentage with chronic gall-bladder disease has been found to be much higher among females than among males. In the present study the rate among wives at all ages was 22 compared with 2 per 1,000 among husbands.

Association of Chronic Disease Among Husbands and Wives

Chronic disease occurred infrequently among husbands and wives under 45 years of age. In this small sample, therefore, it is impossible to study the association of specific diagnoses of chronic illness in married pairs under middle age. However, if the presence of chronic disease in one or both spouses be considered without respect to specific cause of chronic illness, the association of these illnesses in husbands and their wives can

Table 10. Observed and expected number of cases of chronic disease among husbands and wives (both husband and wife married once only—includes widowed).

Classification With Respect to Chronic Disease	Age Group			
	20–34 (390 Pairs)	35–44 (322 Pairs)	45–64 (474 Pairs)	65 + (103 Pairs)
	Observed Number			
Chronic Disease In:				
Both Husband and Wife	5	18	84	36
Husband Only	19	36	74	14
Wife Only	26	23	81	24
Neither Husband Nor Wife	340	245	235	29
	Expected Number			
Both Husband and Wife	1.9	6.8	55.0	29.1
Husband Only	22.1	47.2	103.0	20.9
Wife Only	29.1	34.1	110.0	30.9
Neither Husband Nor Wife	336.9	233.9	206.0	22.1

[12] The 68 cases of arthritis among wives were divided as follows: rheumatoid 9; osteoarthritis 19; chronic degenerative 40; the 38 cases among husbands—rheumatoid 5; osteoarthritis 8; and chronic degenerative 25.

be shown. Here again it was considered advisable to include the 180 widowed pairs. Table 10 shows the observed and expected number of persons with chronic disease in each age group.

Table 11. Values of chi-square and P calculated from four-fold tabulations on the concurrent frequency of chronic disease in husbands and wives.

Age of Husband	Chi-Square	P
20–34	5.78	.01–.02
35–44	24.89	< .0001
45–64	35.21	< .0001
65 +	7.56	< .01

Table 11 shows the chi-square values calculated from fourfold tabulations on the concurrent frequency of chronic disease in husbands and their spouses.

The expected numbers of husbands and wives both having chronic disease, as shown in Table 10, result from the cross-products of the rates for all males and the rates for all females in a specific age group. For example, at ages 20–34 there were 390 married pairs; of these 24 of the husbands and 31 of the wives had chronic disease. The resulting rates were .062 and .079 for husbands and wives, respectively. The cross-product of these rates, .005, is the rate at which chronic disease would be expected to be present in both members of a pair if such conditions occurred at random among husbands and wives. Application of this rate to the 390 pairs gives the expected number of 1.9 pairs (both with chronic disease).

To obtain the expected number of married pairs where the husband only had chronic disease, the rate of .005 was subtracted from the rate .062, that is, the rate of chronic disease among all husbands, and the resulting value .057 was applied to the total 390 pairs. This gave the expected number, 22.1. The same procedure was followed to obtain the expected number of pairs where the wife only had chronic disease.

The chi-square test was then applied to test the hypothesis that the difference between the observed and expected frequencies may be due solely to chance.

In every age group the observed number of instances where both the husband and his wife had chronic disease was con-

siderably greater than the number expected to occur concurrently. For example, at ages 20–34 there were five instances where both the husband and his wife had a chronic illness. If the hypothesis that chronic disease occurred independently in these two population groups composed of 390 husbands and the 390 wives held true, only from one to two instances would be expected where both the husband and his wife would be affected. The chi-square for each age group is statistically significant and indicates that some factor other than a normal or expected variation is responsible for the association noted.

It is appropriate here to point out that inclusion of the widowed and their spouses is not a factor in producing association of chronic disease among husbands and their wives. In fact, if only the living pairs are considered, the chi-square values are slightly higher at ages 20–34 and at 65 and over than are the values shown in Table 11. The values obtained for the other two age groups were not greatly altered by exclusion of the widowed.

Since the chi-square values increase with age, and it will be recalled from Table 4 that the shared environment of the married pairs (average years married) also increased with age, there is some suggestion that socio-environmental factors may play a part in producing some form of chronic illness in both husband and wife. However, environment may be one of several factors operating to produce such results.

Physicians interested in psychosomatic medicine have emphasized the importance of environment as a conditioning factor in producing chronic illness. Ruesch, in discussing the social and cultural factors in delayed recovery from illness, made the following statement: "In the past, many diseases were believed to afflict a random sample of the population and a sick individual was just a person with bad luck. In recent years, however, a change of attitude has come about and such diseases as fractures, hypertension, rheumatic disease, coronary sclerosis, diabetes, and others are conceived as conditions which, if not caused by, at least are related to the personality structure

of the individual. It has long since been pointed out that personality is the result of the interaction between the environment and the individual."[13]

Table 12. Observed and expected number of cases of chronic disease among 99 husbands and wives where one spouse has been married more than once (both husband and wife living).

Classification With Respect to Chronic Disease	Observed Number	Expected Number
Chronic Disease In:		
Both Husband and Wife	26	16.1
Husband Only	11	20.9
Wife Only	17	26.9
Neither Husband Nor Wife	45	35.1
Chi-Square 17.32 P = < .0001		

Many of the chronic illnesses included in this study of married pairs are in the group which may be related to the reaction of the individual to his environment. In addition to some of those cited by Ruesch are: peptic ulcer, gallbladder disease, the psychoneuroses, and asthma. The sample studied is too small to afford more definite data on this point.

The force of suggestion also may be a possible factor affecting the degree of association of chronic illness among husbands and wives. It may be that because one member of a pair has been found to have chronic disease, the other member is more apt to seek a medical examination or to develop symptoms resulting in a diagnosis of illness. If this be a factor, there is no way of describing the extent of its effect upon the data presented.

One hundred and ninety-nine pairs were excluded from the main study because either the husband or the wife had been married more than once. Data of chronic disease are available for 99 of these pairs since in these instances both present spouses were living and observed for morbidity. The association of chronic disease without respect to cause of illness or age of husband among these pairs is shown in Table 12. The age distribution of this group was weighted by middle and old-age persons

[13] Ruesch, Jurgen: Chronic Disease and Psychological Invalidism. The American Society for Research in Psychosomatic Problems. New York, 1946.

so it was considered suitable to show the data for all ages combined. Again, there is a significant association of chronic disease among husbands and wives. The first marriage of some of these pairs ended in divorce. Since information on chronic disease was lacking for one member of these pairs, it was impossible to study both first marriages and subsequent marriages for this group of spouses.

Chronic disease by specific cause can be considered only for the couples 45 years of age and over. A significant association was found for all circulatory diseases, for hypertensive vascular disease, and for arthritis. The data are shown in Table 13. When heart disease alone is considered, no significant association was noted. The chi-square value for heart disease when based upon living pairs only was 1.19 with a P of around 27 out of 100. When the widowed are included, the chi-square value was raised to 2.82 with a P of 9 out of 100. The degree of association for those causes of chronic disease shown in Table 13 were not markedly affected by the inclusion of the widowed and their spouses.

Association of the Chronic Diseases

Among the living husbands and wives aged 45 and older,

Table 13. Observed and expected number of concurrent cases of circulatory disease, hypertensive vascular disease, and arthritis among 577 husbands and wives 45 years of age and older (husband and wife married once only and including widowed).

Classification With Respect to Chronic Disease	Hypertensive Vascular Disease		Total Circulatory Disease		Arthritis[1]	
	Observed	Expected	Observed	Expected	Observed	Expected
Chronic Disease In:						
Both Husband and Wife	5	1.3	34	19.8	9	3.5
Husband Only	15	18.7	75	89.2	18	23.5
Wife Only	33	36.6	71	85.2	47	52.5
Neither Husband Nor Wife	524	520.4	397	382.8	363	357.5
Chi-Square	11.28 P=.0008		15.21 P=<.0001		10.89 P=.001	

[1] Based upon 437 married pairs, both living.

there were 73 who had multiple chronic diseases. It is possible therefore to study the association of certain types of diseases in the same person. In this analysis the 150 widows and the 30 widowers are included, but their dead spouses are excluded. The total population consisted of 1,014 persons.

The conditions which occurred most frequently were arthritis, 10 per cent of the total persons; heart disease, 11 per cent; and hypertensive vascular disease, 5 per cent. It is also of interest to consider diabetes even though only 2 per cent of the persons studied had this condition. Table 14 shows the observed and expected number of persons with both arthritis and heart disease and those with both arthritis and hypertensive vascular disease. Arthritis and heart disease showed no statistically significant association; the observed number of persons with both chronic conditions was 13 and the expected number was 11. The association of arthritis and hypertensive vascular disease, however, was found to be statistically significant. The association of these two chronic conditions in the same person may be partly due to the fact that persons who have hypertensive disease or chronic degenerative arthritis have been found in many instances to be overweight or obese. Overweight places special stress upon the weight-bearing joints and upon the

Table 14. Observed and expected number of persons with multiple chronic disease (1,014 living persons aged 45 and over).

Classification With Respect to Chronic Disease	Observed Number	Expected Number	Chi-Square	P
Both Arthritis and Heart Disease	13	11.3		
Arthritis Only	100	101.7		
Heart Disease Only	88	89.7	2.77	.09
Neither Arthritis Nor Heart Disease	813	811.3		
Both Arthritis and Hypertensive Vascular Disease	10	5.5		
Arthritis Only	91	95.5		
Hypertensive Vascular Disease Only	45	49.5	4.38	.04
Neither Arthritis Nor Hypertensive Vascular Disease	868	863.5		

arterial system. These facts have been pointed out by Cecil[14] and by Morgan.[15] It will be recalled that the category "arthritis" in this study included chiefly the chronic, degenerative types of the disease.

Data which show the occurrence of diabetes with arthritis, and diabetes with heart disease are presented in Table 15. In the experience of this study the association of diabetes with arthritis was not found to be statistically significant. The actually observed concurrent frequency of these two conditions was not significantly different from the theoretical concurrent frequency when there is no association between the two.

In middle and old age, diabetes is usually accompanied by arteriosclerosis and some cases develop complications such as perforating ulcer of the foot and gangrene. About 50 per cent of the 21 diabetic patients in this study had diagnoses which indicated the presence of some form of arterial disease. Since the prevalence of arterial disease was relatively high among these patients, it is not unreasonable to expect some association of heart disease with diabetes. Table 15 shows that 6 persons had both diabetes and heart disease. On the assumption that

Table 15. Observed and expected number of persons with multiple chronic diseases (1,014 living persons aged 45 and over).

Classification With Respect to Chronic Disease	Observed Number	Expected Number	Chi-Square	P
Both Diabetes and Arthritis	4	2.1	1.87	0.17
Diabetes Only	97	98.9		
Arthritis Only	17	18.9		
Neither Diabetes Nor Arthritis	896	894.1		
Both Diabetes and Heart Disease	6	2.3	6.62	> 0.01
Diabetes Only	15	18.7		
Heart Disease Only	107	110.6		
Neither Diabetes Nor Heart Disease	886	882.4		

[14] Cecil, Russell L.: Textbook of Medicine by American Authors. Philadelphia, W. B. Saunders Company, 1942, 5th Edition, p. 1431.

[15] Morgan, Hugh J.: Hypertension. Cecil's Textbook of Medicine by American Authors. Philadelphia, W. B. Saunders Company, 1942, 5th Edition, p. 1234.

these two conditions occur independently, only 2.3 instances would be expected where both were present in the same person. The chi-square value, 6.62, indicates that diabetes and heart disease were found in this study to be significantly associated.

The general results of this study of chronic disease among married pairs indicate that there is a tendency for chronic disease to be concentrated among spouses in family units. This fact emphasizes the need for greater consideration and study of the patient in his social setting with particular attention to the family environment. In a program for prevention of chronic disease it may even be necessary for the physician to undertake or direct some form of treatment of the family unit in addition to concentrating attention upon the member of the family who has a chronic condition.

Summary

This report has presented a study of chronic disease in a population composed of 1,289 husbands and their wives. The prevalence of persons with such illness increased markedly with age. At ages 65 and over the rate for each spouse group was about 4 times as great as the rate at ages 20–34. There were no important sex differences in prevalence in any age group.

The annual incidence of chronic disease among living married pairs increased as age increased. For all age groups combined the rate among wives was 25 per cent higher than that among husbands.

When chronic illness by specific cause or diagnosis was considered, there was some variation in the rates for husbands and wives. There was a higher prevalence of tuberculosis, malignant neoplasm, psychoses, and hernia among husbands than among their wives. Ulcer of the stomach and duodenum occurred among husbands only. For all other causes of illness, except asthma, the rates were higher among wives than among husbands. Chronic illness was concentrated chiefly among husbands and wives aged 45 and over.

The association of chronic disease without respect to cause was studied for husbands and their wives in four different age

groups. In each age group the observed number of instances where both the husband and his wife had a chronic disease was considerably greater than the number expected to occur concurrently. These differences were statistically significant.

Chronic disease by specific cause was considered only for the married pairs 45 years of age and over. A significant association of illness in both husband and wife was found for all circulatory diseases combined, for hypertensive vascular disease and for arthritis. When heart disease alone was considered, there was no indication of a significant association.

The association of certain multiple chronic diseases in the same person was studied. Arthritis and heart disease showed no significant association. The association of arthritis and hypertensive vascular disease, however, was found to be statistically significant. Diabetes and heart disease occurred in the same person more frequently than expected, and the association of the two conditions was considered significant.

The Morbidity Study in the Eastern Health District of Baltimore was conducted by the United States Public Health Service and the Milbank Memorial Fund.

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Appendix Table 1. Number of cases of chronic disease by causes among husbands and wives at different ages (both husband and wife living, married once only).

Classification of Chronic Disease	Total 1,109	20–34[1] (377 Pairs)	35–44 (295 Pairs)	45–64 (377 Pairs)	65+ (60 Pairs)
Tuberculosis					
Both Husband and Wife	0	0	0	0	0
Husband Only	11	1	3	6	1
Wife Only	4	3	0	1	0
Neoplasm (Malig.)					
Both Husband and Wife	0	0	0	0	0
Husband Only	7	0	0	5	2
Wife Only	5	0	0	3	2
Diabetes					
Both Husband and Wife	2	0	0	2	0
Husband Only	5	0	2	3	0
Wife Only	10	0	1	8	1
Psychoses					
Both Husband and Wife	1	0	0	1	0
Husband Only	6	2	2	2	0
Wife Only	4	0	1	3	0
Psychoneuroses					
Both Husband and Wife	1	0	0	1	0
Husband Only	7	3	3	0	1
Wife Only	25	8	8	8	1
Heart Disease					
Both Husband and Wife	6	0	0	3	3
Husband Only	41	2	4	25	10
Wife Only	46	4	5	26	11
Hypertensive Vas. Dis.					
Both Husband and Wife	4	0	0	3	1
Husband Only	16	1	3	8	4
Wife Only	29	2	2	20	5
Circulatory Disease					
Both Husband and Wife	19	0	0	11	8
Husband Only	48	3	7	28	10
Wife Only	66	6	7	41	12
Varicose Veins					
Both Husband and Wife	0	0	0	0	0
Husband Only	5	0	2	2	1
Wife Only	19	0	4	11	4
Ulcer of Stom. & Duod.					
Both Husband and Wife	0	0	0	0	0
Husband Only	9	4	3	2	0
Wife Only	0	0	0	0	0
Gall-Bladder Disease					
Both Husband and Wife	0	0	0	0	0
Husband Only	2	0	1	1	0
Wife Only	24	4	4	13	3
Nephritis					
Both Husband and Wife	0	0	0	0	0
Husband Only	0	0	0	0	0
Wife Only	1	0	0	1	0

(Continued on page 358)

Appendix Table 1—Continued

Classification of Chronic Disease	Total 1,109	20–34[1] (377 Pairs)	35–44 (295 Pairs)	45–64 (377 Pairs)	65+ (60 Pairs)
Arthritis					
Both Husband and Wife	10	0	1	9	0
Husband Only	28	1	9	14	4
Wife Only	58	4	7	33	14
Hernia					
Both Husband and Wife	0	0	0	0	0
Husband Only	30	1	6	17	6
Wife Only	6	1	0	5	0
Asthma					
Both Husband and Wife	0	0	0	0	0
Husband Only	11	1	3	5	2
Wife Only	11	1	4	5	1

[1] At ages 20–34 among husbands there were in addition 2 cases of chronic disease of the prostate, one of renal calculi, and one case of syphilis. Among wives there was one case of toxic goiter and one case of syphilis.

Appendix Table 2. Number of cases of chronic disease by cause among husbands and wives at different ages (both husband and wife married once only—includes widowed).

Classification of Chronic Disease	Total 1,289	20–34 (390 Pairs)	35–44 (322 Pairs)	45–64 (474 Pairs)	65+ (103 Pairs)
Tuberculosis					
Both Husband and Wife	0	0	0	0	0
Husband Only	17	2	4	10	1
Wife Only	6	3	0	3	0
Neoplasm (Malig.)					
Both Husband and Wife	1	0	0	0	1
Husband Only	25	0	3	19	3
Wife Only	12	0	1	7	4
Diabetes					
Both Husband and Wife	2	0	0	2	0
Husband Only	8	1	3	4	0
Wife Only	18	0	3	9	6
Circulatory Disease					
Both Husband and Wife	35	0	1	20	14
Husband Only	92	5	12	52	23
Wife Only	88	7	10	53	18
Heart Disease					
Both Husband and Wife	15	0	0	8	7
Husband Only	88	4	10	50	24
Wife Only	64	4	8	37	15
Hypertensive Vas. Dis.					
Both Husband and Wife	5	0	0	4	1
Husband Only	19	1	3	10	5
Wife Only	39	3	3	24	9

GENETIC AND SOCIAL SIGNIFICANCE OF DIFFERENTIAL FERTILITY

I. PRESENT KNOWLEDGE CONCERNING THE EFFECTS OF DIFFERENTIAL FERTILITY

HAROLD F. DORN[1]

DIFFERENTIAL rates of reproduction of separate population groups is not a new phenomenon. Although accurate statistics permitting measurement of existing differences in fertility of various groups in the population are of relatively recent origin, and even now are available only for a small part of the world's population, nevertheless there is sufficient historical evidence to support the belief that differential fertility is as old as the human race. Only one example will be cited here:

About 1650, the population of Europe numbered approximately 100,000,000 and constituted 18 per cent of the estimated total population of the world. In the following three centuries these people multiplied in number more than seven times so that by 1933 their descendants had increased to 720,000,000 and their proportion of the total population of the world had risen from 18 to 35 per cent (1). The people of Western Europe and North America have passed their peak of rapid population increase and now are reproducing at a lower rate than many other large population groups so that they will, in time, comprise a smaller proportion of the world's population.

Thirty years ago the differential rate of growth of national population groups was a subject of much discussion. In recent years however, demographers have devoted more attention to differential reproduction rates of segments of the population within national groups, so that today the term differential fertility is usually understood as implying unequal reproduction rates of social or economic classes of the population.

[1] From the Division of Public Health Methods, United States Public Health Service.

Differential fertility in this sense probably has become important only in relatively recent times. Many historical accounts exist of the failure of the "upper classes" to reproduce as rapidly as the "lower classes," but the evidence on which these accounts are founded is not clear cut (2). Regardless of their reproduction rates, the "upper classes," until the last century or so, numerically were so small relative to the total population that their fertility had little effect upon either the quantity or quality of the population of which they were a part. Today, however, numerically significant portions of our population are reproducing themselves solely as a result of an age distribution favorable to a large number of births. As the age distribution changes to that which current birth and death rates will support, the excess of births over deaths will change to an excess of deaths over births unless age specific fertility rates are increased. The probable failure of numerically large segments of our population to reproduce themselves means that the physical and mental characteristics of the future population will be determined to an increasing extent by those whose fertility is sufficiently great to provide an excess of births over replacement needs.

Table 1. Ratio of the net reproduction rate for specific urban classes to the corresponding rate for the total urban white population, United States, 1935–36.[1]

Class	Ratio
Annual Family Income	
$3,000 and over	.60
$2,000–2,999	.79
$1,500–1,999	.90
$1,000–1,499	1.07
Under $1,000	1.37
Education (Females)	
College	.74
High School	.97
7th or 8th grade	1.23
Less than 7th grade	1.39
Total Population	1.00

[1] From reference 3.

Many bases of classification of the population into groups or classes have been used: color, nativity, religion, income, education, occupation, region, and size of community are the more common. The general results of investigations in the United States of the relationship of fertility to groups of the popula-

tion classified in these ways are well known and are in substantial agreement so that they will be referred to here only briefly.

Table 1 shows the relative rank with respect to net reproduction rates of classes of the urban population when grouped by income and education. Corresponding differences exist when other bases of classification are used. The fertility of Catholics is usually higher than that of Protestants in the same area (4). Farmers, unskilled laborers, and miners exceed in fertility skilled workers and business and professional people. When population is classified by size of community, fertility rates decline from a high for the rural-farm population to a low for the population residing in large cities (5). No matter what criteria of classification are used some groups of the population are found to contribute a disproportionate number of new recruits to the population of the future. In general, these groups have the lowest income and the least education; they are primarily manual workers and live in areas with the least adequate health, educational, and cultural opportunities and facilities.

What do these differences in fertility portend concerning the characteristics of the future population of the United States? But little progress has been made in assembling scientific evidence from which an answer to this question can be made. In the absence of scientific evidence, opinion and prejudice reign supreme. No general agreement exists among demographers concerning the effects of differential fertility upon the quality of the population.

One reason for the failure of demographers to investigate more thoroughly the effects of differential fertility undoubtedly is the scientific disrepute of many of the statements concerning this subject which have been made by well-meaning but ill-informed eugenists. Contending that those who rise to the top socially and economically have the best genetic and cultural heritage, eugenists claim that the present differential fertility of social and economic classes is dysgenic and that as a result the average ability of the population is being lowered. Perhaps an

even more important reason is the fact that human genetics and psychology have not yet accumulated a sufficient body of scientific knowledge about human abilities and their distribution throughout the population to permit a valid determination of the effects of differential fertility.

Neither of these reasons however, is sufficient to excuse the failure of demographers to investigate scientifically the effects of differential fertility. The potential significance of current differences in reproduction rates among social and economic classes for the future population of the nation is great enough to demand the most careful investigation. But before much progress can be made in evaluating the effects of class differentials in fertility it will be necessary to define more specifically the objective.

Firstly, the specific traits which we desire to have perpetuated must be defined. Moreover these must be defined so that valid measures of their presence or absence can be established. Only then can verifiable observations be made of the distribution of these traits among the various social and economic classes of the population. Once traits have been identified and valid measures developed, the relation of these traits to definite types of hereditary behaviour should be investigated in order to ascertain the extent to which they are dependent upon the genetic qualities of the population and the extent to which they arise from the cultural environment. Studies of the change in the proportion of individuals with specific traits between two successive generations would furnish the basis for evaluating the effects of differential fertility upon the quality of the population.

Turning to the evidence which is cited in support of statements concerning the effects of class differentials in fertility it is impossible to find any significant amount of data which meet all the criteria in the preceding paragraph. No general agreement exists concerning the traits which should be preserved in the population. Lack of agreement is not serious however, insofar as investigation of the distribution of traits

among social classes is concerned except as it may influence the traits to be investigated.

More progress has been made in the identification, measurement, and determination of the dependence upon genetic factors of physical than of mental traits. Knowledge is accumulating concerning the role of heredity and the mechanism of its action in the development of many physical defects and diseases so that statements concerning the probability of such conditions appearing among offspring can be made with considerable assurance. There is no evidence that biologically undesirable physical defects tend to be disproportionately frequent in certain social and economic classes and, except for some racial extremists, few people believe that differential fertility is causing the physical deterioration of our population. This is not to deny the desirability of discouraging individuals with physical defects, such as Huntington's Chorea, hereditary optic atrophy, and similar conditions whose mode of genetic behaviour is fairly well understood, from procreating children but such action is applicable to individuals and not to entire social or economic classes.

In contrast to our knowledge of physical traits, that concerning mental traits is exceedingly meager. In the eighty years since the publication of Galton's HEREDITARY GENIUS, interest has centered primarily on tests of "intelligence." Even today however, psychologists disagree sharply as to whether intelligence is a single specific mental trait or is a cluster of distinct elements more or less interrelated. Fortunately this disagreement has not prevented continued efforts to improve tests for the measurement of intelligence, to investigate the response of various groups of the population to such tests and to attempt to ascertain the influence of environmental factors upon its development.

Studies of twins and foster children have shown that I.Q. scores can be altered by changes in the environment. Increases of as much as twenty to thirty points have been reported but the average change to be expected is probably in the neighbor-

hood of five to ten points. It is equally clear that heredity places limits upon the possible development of a given individual and that individual differences in I.Q. scores persist in spite of the most enriched environment.

Although a few investigators claim that environmental influences can largely determine an individual's I.Q. score, probably most investigators would agree that genetic factors account for more than 50 per cent. Estimates ranging from 50 to 95 per cent for the relative weight of heredity have been put forth but these depend largely upon the investigator's predilections.

When children are grouped according to father's occupation, arranged in broad social economic classes, the average I.Q. score usually is lowest for children of unskilled laborers and highest for children of professional persons. Some studies have reported a range in average I.Q. score of as much as 20 to 25 points from the lowest to the highest classes. Other investigations show a negative correlation of about 0.2 between I.Q. score and size of family. From these facts some have concluded that the "upper" classes are more intelligent on the average than the "lower" classes so that the effect of differential fertility is to lower the average intelligence of the total population.

Cattell estimated that the average I.Q. is declining at the rate of 3 points per generation (6). Fraser Roberts reported that based upon his studies of the child population of Bath, England, the fall in average I.Q. was about 1½ points per generation (7). In the United States, Lentz calculated that in the urban population the decline in the median score from one generation to another was as much as 4 to 5 points (8). Lorimer and Osborn concluded that the average decline in the median I.Q. score was 0.9 of a point per generation (9).

It should be remembered that these calculations are theoretical and are based upon observations on a single generation. No one has yet reported investigations of I.Q. scores in successive generations which support these claims. The implication exists that intelligence tests measure the most important of all

mental traits and that an increase in the average I.Q. score of the population would be desirable. While no one seriously advocates that the quality of the population would be improved by deliberately lowering the average I.Q. score by 25 points, if this were possible, it is not at all clear that raising the average I.Q. score to 130 or 140 would in itself increase the well being of our population.

Certainly there are differences in the ability of an artist, an engineer, a mathematician, an aeroplane pilot, a motor mechanic, a pianist, and a chemist which are not represented by differences in I.Q. scores. Temperament and emotional stability undoubtedly profoundly influence an individual's achievement. Research in the domain of mental traits other than intelligence has made little headway and is no further developed than intelligence testing was forty years ago. Leadership, initiative, ambition, and similar socially desirable characteristics are merely philosophical concepts. Until temperamental, emotional, and volitional traits are defined in such a manner that valid tests can be devised for their measurement, speculation concerning the effect of differential fertility upon their distribution throughout the population, at best, can be but a well informed guess and, at the worst, will be an expression of a preconceived prejudice.

Is the present pattern of differential fertility lowering the average quality of our population? In this form the question is incapable of scientific answer. Not until the general concept, ability, is separated into specific measurable components can the scientific evidence necessary to answer this question be accumulated. As yet, repeatable measurements have been made of only one mental trait, intelligence, and the precise meaning of this trait still is a matter of dispute. Differential fertility of social classes has existed much as it is today for nearly two generations at least. No longitudinal time studies have been reported which support the conclusions drawn by some from cross-sectional time studies that the average I.Q. of our population is decreasing in successive generations.

Even though we do not have sufficient scientific evidence to determine the effects of differential fertility upon the genetic qualities of our population we do have sufficient evidence to be sure that a large proportion of the recruits of the next generation come from the classes of our population which are the least able to provide maximum cultural and health advantages. So long as differential fertility operates in a way that denies opportunity for maximum development of innate ability it acts counter to the professed ideals of our society and as such is a matter of serious concern.

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GENETIC AND SOCIAL SIGNIFICANCE OF DIFFERENTIAL FERTILITY

II. A STATEMENT OF GENERAL PRINCIPLES AND CONCEPTS OF POPULATION GENETICS

LAURENCE H. SNYDER[1]

THE first half of the present century has witnessed the extensive development of the principles of genetics. The formulation of these principles was brought about largely through careful laboratory analyses. Only recently has careful attention been given to the study of human genetics. As that study has progressed, it has become apparent that there are important differences between the genetic analysis of human populations and the genetic analysis of laboratory animals.

The laboratory study is *experimental;* that is to say, the matings are controlled in a uniform environment and made according to a definite plan in the mind of the experimenter: a plan designed to test the genetic nature of a trait by specifying the mating so that observable Mendelian ratios may result. Through examination of these ratios, the genetic basis for a trait may be estimated.

Human matings, on the other hand, occur largely at random as far as most gene pairs are concerned, and the number of offspring in a single family is small. It is thus difficult to specify the *genotype* of each individual. Collections of families must therefore be classified largely by *phenotypic* characters. The result is that even the best classified data will contain mixtures of different types of mating.

All the types of mating which the geneticist needs to analyze a trait are probably present in any considerable population of people, but they are largely incapable of being accurately sorted out. Under such circumstances, involving large populations

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breeding more or less at random, it becomes necessary to invoke certain concepts which need not ordinarily be considered in laboratory analyses. These concepts are the proportions in the population of a gene and its alleles (alternative conditions), and the proportions of the genotypes formed by a gene and its alleles. Thus the genetic analysis must be made, not on the basis of Mendelian ratios, but on the basis of population ratios. In other words, the study of human genetics is largely a study of population genetics.

The concepts of population genetics may be formulated as principles. Some of these principles are germane to this round-table discussion.

1. Classical Mendelian ratios are not to be expected in random samples from a free-breeding population, nor even necessarily among the offspring of a group of families classified together because the parents in any one family are phenotypically identical with the parents in any other family. Classical Mendelian ratios are to be looked for only among the offspring of a large family, or within a collection of families where the parents in any one family are *genotypically* identical with the parents in any other family.

2. Although classical Mendelian ratios are not to be expected among the offspring in a collection of families where the parents are of variable genotypes, even though of identical phenotypes, nevertheless predictable ratios do occur under such situations. These ratios are *population ratios*, in contrast to Mendelian ratios. They are expressed in terms of the proportions in the population of the genes concerned, and they vary as these proportions vary. Thus, where a common Mendelian ratio is, for example, ¾:¼, an equally common and analogous population ratio is $\frac{1+2q}{(1+q)^2}:\frac{q^2}{(1+q)^2}$, where q is the proportion of the recessive gene in the population.

3. A demonstrated correlation between the occurrence of two traits in a randomly breeding population does not necessarily indicate linkage between the genes for these two traits.

4. In a large population, with the effects of mutation, selec-

tion and migration negligible or balancing each other, the proportions of the alleles of any set will remain constant from generation to generation. Furthermore, under a system of random mating, the proportions of the genotypes will likewise remain constant. This means that in a large human population, with no appreciable effects of mutation, selection, or migration, the frequency of a hereditary trait will remain constant from generation to generation.

5. The respective proportions of the alleles of a set may, however, be changed by any one of the above phenomena (mutation, selection, and migration), and, particularly in small populations, by still another process, random drift of gene proportions. Under selection would be included differential fertility.

6. Differential fertility will change the respective proportions of the alleles of any set, and thus presumably the proportions of the traits determined by these genes, provided that

a. The groups having differential fertility differ one from the other in regard to the occurrence of the trait, and

b. The trait concerned is dependent, at least to some appreciable extent, upon genetic factors.

7. Assortative mating in regard to the trait will increase the rate of the effect of differential fertility.

8. Dominant genes can readily be eliminated by complete selection against them, or partially eliminated in proportion to the degree that selection is used (for example, the degree of differential fertility).

9. Recessive genes can never be completely eliminated by differential fertility, even if selection against them is complete. The proportions of such genes can, however, be reduced by differential fertility.

10. Selection against *common* recessive traits is markedly effective at first, less and less so as the genes for the trait become rarer. This effect may be exactly specified. If, under a system of random mating, a recessive trait occurs in 17.2 per cent or more of the population, the trait can be cut to one half of its former frequency or less in a single generation of complete selection against it. Expressed in another way, the half life, under complete adverse selection, of a recessive trait occurring in 17.2

Table 1. A table to show the reduction in frequency of a recessive trait in a large population if complete selection against the trait occurs.

	Frequency of a Recessive Trait in the Population																		
Original Frequency	.005	.010	.020	.030	.040	.050	.100	.200	.300	.400	.500	.600	.700	.800	.900	.990
After 1 Generation	.004	.008	.015	.021	.028	.033	.057	.095	.125	.150	.172	.191	.208	.223	.237	.249
After 2 Generations	.003	.007	.012	.016	.019	.024	.037	.055	.068	.078	.086	.093	.098	.103	.107	.111
After 3 Generations	.002	.006	.009	.013	.015	.018	.026	.036	.043	.047	.051	.055	.057	.059	.061	.063
After 4 Generations	.001	.005	.008	.011	.012	.014	.019	.025	.029	.032	.034	.036	.037	.038	.039	.040
After 5 Generations		.004	.007	.009	.010	.011	0.15	.018	.021	.023	.024	.025	.026	.027	.027	.028
After 6 Generations		.003	.006	.008	.008	.009	.012	.014	.016	.017	.018	.019	.019	.020	.020	.021
After 7 Generations		.002	.005	.007	.007	.008	.010	.011	.013	.013	.014	.015	.015	.015	.015	.016
After 8 Generations		.001	.004	.006	.006	.007	.008	.009	.010	.010	.011	.012	.012	.012	.012	.013
After 9 Generations			.003	.005	.005	.006	.007	.008	.008	.008	.009	.010	.010	.010	.010	.011
After 10 Generations			.002	.004	.004	.005	.006	.007	.007	.007	.008	.008	.008	.008	.008	.009
After 11 Generations			.001	.003	.003	.004	.005	.006	.006	.006	.007	.007	.007	.007	.007	.008
After 12 Generations				.002	.002	.003	.004	.005	.005	.005	.006	.006	.006	.006	.006	.007
After 13 Generations				.001	.001	.002	.003	.004	.004	.004	.005	.005	.005	.005	.005	.006
After 14 Generations						.001	.002	.003	.033	.003	.004	.004	.004	.004	.004	.005
After 15 Generations							.001	.002	.002	.002	.003	.003	.003	.003	.003	.004
After 16 Generations								.001	.001	.001	.002	.002	.002	.002	.002	.003
After 17 Generations											.001	.001	.001	.001	.001	.002
After 18 Generations																.001

per cent of a randomly breeding population, is one generation. Under similar circumstances, the half life of a recessive trait occurring in four per cent of the population is two generations; that of a recessive trait occurring in two per cent of the population is three generations; and that of a recessive trait occurring in but one per cent of the population is four generations.

As a trait due to a recessive gene becomes rarer, its half life becomes longer.

Differential fertility implies that adverse selection is not complete, hence the half life of a trait in such circumstances becomes correspondingly longer.

The essential things to be established in order to specify the genetic implications of differential fertility are, then, these:

1. Does differential fertility actually exist between certain groups? If so, what is the extent of the differential fertility?
2. Do these groups actually differ in regard to the proportions of a specific trait? If so, what are the respective proportions of the trait in the various groups?
3. Is the trait genetically determined? If so, what is the mode of transmission?
4. Does assortative mating occur in regard to the trait? If so, what is the nature and extent of the assortative mating?

Given the answers to these questions, the geneticist can specify the expected genetic results of differential fertility.

Assume a large population breeding at random, and being in equilibrium for a pair of alleles *A* and *a*, where p is the proportion of *A* and q is the proportion of *a*. The genotypes in the population will occur in the equilibrium ratio $p^2AA + 2pq\,Aa + q^2aa = 1$. Further assume the instituting of complete selection against the genotype *aa*. The proportion of *aa* individuals produced in the next generation will then be $q^2/(1+q)^2$. These individuals will, of course, be produced entirely from matings of heterozygotes *Aa* (Snyder 1934).

Table 1 shows the effect of complete selection against the recessive phenotype starting with various proportions in the original generation.

Where selection against the recessive phenotype is not complete, such as in differential fertility, the calculation of the diminishing proportions of recessives is more complex. Haldane (1931) has presented a formula for these calculations as follows:

$$n = 1/k(u_n - u_o - \log_e u_n/u_o)$$

where

n = number of generations required to change the value of u from u_o to u_n;

u = ratio of the frequency of a given dominant gene to its recessive allele;

k = coefficient of selection against the recessive phenotype. If k, for example, is 0.01, the proportion of offspring from dominant and recessive parents, respectively, will be 1:0.99 instead of 1:1.

Haldane's formula may also be written in terms of the more usual gene proportions p and q, as follows (David, personal communication):

$$n = 1/k[1/q_n - 1/q_o + \log_e(p_n/q_n) - \log_e(p_o/q_o)]$$

Selection is extremely slow, but nevertheless effective, even with low values of k. The greater the initial proportion of the recessive phenotype, the more rapidly will selection reduce this proportion in the early generations. The rate of reduction becomes less as the proportion diminishes. With a selection coefficient of 0.01, it would require 1,090 generations to reduce an initial recessive phenotype proportion of 0.9999 to 0.25, but 1,020 generations to reduce it from 0.25 to 0.01.

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GENETIC AND SOCIAL SIGNIFICANCE OF DIFFERENTIAL FERTILITY

III. A REVIEW OF RELEVANT RESEARCH ON THE INHERITANCE OF MENTAL TRAITS

GARDNER MURPHY[1]

IN the hope that some comments from a psychologist may integrate helpfully with the survey which Dr. Snyder has given us, I shall sketch under the following heads some research trends in the inheritance of mental traits which may have implications for population research, and perhaps even ultimately for population policy:

1. Quantitative studies from animal breeding experiments which throw some light on the inheritance of learning abilities and emotional dispositions.
2. Parallel studies of human material, conducted by pedigree and life history methods, the aim being primarily to show the degree of continuity and of flexibility in attributes which are evident in the opening weeks of life.
3. Various fragments of evidence on the effects of the differential fertility of social classes on intellectual and temperamental attributes of the population, together with some free and speculative interpretations of the meaning of such data, and with some still more speculative comments on the likely effect of continuance of present policy—or rather lack of policy.
4. A specification of types of experimental and life history material which might bring this whole thing down to earth and give us within a few years some much more solid facts to go on.

STUDIES OF ANIMAL SUBJECTS

Though stock breeders, dog fanciers, and experimental geneticists have long dealt with the problem of the inheritance of ability and temperament, it remained for R. C. Tryon at the University of California to begin, some twenty years ago, a long-range study of the effects of inbreeding upon objectively

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measurable psychological capacities. He chose maze-learning ability in the rat as his problem, and proceeded in each generation to mate bright with bright, dull with dull, as defined by the small or large number of errors made in his maze-learning problem. After eight generations of such inbreeding, the two groups became distinct with no overlapping and they remained so throughout the many subsequent years of work. By brother-sister mating, attempts were made to reduce the great variation within each of the sub-populations—the bright and the dull. The genetic problem proved to be insoluble; indeed, the variation within each of these sub-populations remained large. But in the fact of non-overlapping lay indisputable evidence of a determining role played by genes in maze-learning. More recently, Tryon and Searle have undertaken, with fair success, to analyze more precisely what this maze-learning ability actually consisted of.

Temperament has been studied by about the same method as maze-learning. Calvin Hall at Western Reserve University, pursuing a method similar to Tryon's, selected in each generation the most timid and the least timid among a group of rats, and after a few generations found that he had distinctive sub-populations which bred true thereafter, again not in terms of identifiable genes, but in terms of sharply defined and non-overlapping dispositions.

By far the most extensive work along these lines can now be expected from the Jackson Memorial Laboratories at Bar Harbor, and the affiliated Hamilton Station: the Jackson Laboratory is well-known for its cancer research, while the Hamilton Station is primarily concerned with the problem of the inheritance and behavior dispositions. A long-range research program is being undertaken in which temperament and many other attributes are to be studied. One big advantage of the Bar Harbor situation is the definite identification of a great many genes with appropriate chromosome mapping in mice and other species, and the possibility of noting the appearance and disappearance of temperamental attributes as certain genes

pass in or out of the picture. Problems of linkage and of the combined effect of two or more genes in relation to temperament become manageable which are otherwise likely to be beyond control.

Studies of Human Subjects

Studies of human inheritance which specially interest the psychologist include such problems as: (1) the existence of true Mendelian psychological traits; (2) the stability of individual temperamental traits throughout the growth period in such a way as to suggest an hereditary factor; (3) intellectual resemblance of individuals in terms of the closeness of their biological relationship; (4) the changing form of the nature-nurture problem as educational conditions change, and (5) the range and limits of human intellectual capacity. Under the first of these headings should be especially stressed such exquisitely clear Mendelian material as the studies of that special type of mental defect in which phenylpyruvic acid appears in the urine. This particular type of defect has been studied by Jervey and others, and has been shown to be a simple Mendelian trait. In a family, for example, of seven children, four show phenylpyruvic acid and three do not; the first four are mentally defective, the remaining three are not. We are apparently dealing with a metabolic irregularity which damages the central nervous system of all those in whom it appears. No one today thinks of mental deficiency in general as a simple Mendelian trait, yet here we may specify the operation of specific genes in terms of specific intellectual consequences.

Under the heading of temperamental continuities should be mentioned the numerous studies in which quantitative differences in temperamental responses from one infant to another are followed through the vicissitudes of early life experience. Ruth Washburn, for example, used twelve experimental situations which make most babies laugh or smile. Every four weeks through the first year of life, she studied the tendency of each one of nearly fifty children to laugh, smile, remain stolid, or

cry in response to each of these twelve stimuli. She found remarkably clear-cut continuity under reasonably well-defined and uniform conditions. In the same way, Mary Shirley found with twenty-five babies tested during the first two years of life that the test situations, and the contacts with the examiners in the home, elicited rather similar temperamental responses month by month. It was not a question of the child's doing the *same thing* at each age level. Take, for example, the trait of doing the unpredictable. Shirley had foreseen most of the things which most babies would do at each age level. The percentage of familiar or expected responses and the percentage of unexpected and unpredictable responses was fairly constant throughout the two years, even though the specific things that the child did at each age level were, of course, very different. One gains the impression from such material that there are certain broad biological dispositions of the living organism which take different forms at different age levels, but which bespeak a certain basic continuity which has some genetic basis.

In the matter of nature and nurture in relation to intelligence, there is perhaps more controversy and more acrimony than the quantitative data warrant. Take, for example, the much-discussed difference of opinion between Barbara S. Burks on the one hand and F. N. Freeman and his collaborators on the other. The former is usually quoted as taking a straight hereditarian position, the latter as inclining to environmentalism. As Burks defined the problem, we have the question of the percentage of variance in obtained distributions of I.Q. attributable to variance in stock and variance in home environment (the data on variance in environmental factors other than those in the home remaining as yet incompletely quantitative). Actually, when one uses such a percentage method, the role of variance in heredity will depend on the range within which environment varies. Suppose, for example, that the measured environments in which Burks' children grew up varied through a narrower range than those in Illinois to which Freeman invited attention. The results of a narrower or a wider range

in environmental conditions would be to play up or to play down respectively the role of hereditary variance. Since the Burks and Freeman material are not strictly comparable in these terms, there would be nothing shocking about the appearance of different quantitative results as regards heredity. Actually, Burks' data seem to suggest that if an average child were placed at birth in a home one sigma above the mean in environmental opportunity, the child would obtain an I.Q. (at the age of ten or twelve) somewhere around 107 or 108 on the average, and there is nothing in the Freeman material that necessarily conflicts with such an interpretation. What we do know is that marked improvement in opportunity does jack up the I.Q. a good many points, and that the earlier the process begins the more salutary the results are likely to be. We also know, however, that there are always limits, and that human protoplasm talks its own language instead of yielding completely to forces which would try to make of it anything they wish. We are not yet ready for an exact quantitative statement of the nature-nurture problem as regards intelligence.

I should like in this connection to call attention to a neglected aspect of social policy. It is rather odd to find that a good many conservatives, near-conservatives, and "aristocrats" are inclined to emphasize biological individuality and, roughly speaking, that most equalitarians, humanitarians, democrats—call them what you will—are inclined to emphasize the general likeness and equality of all human material. A moment's reflection will show that if we should move in the direction of an extreme increase in inequality of opportunities, as might be suggested by extremely conservative or even Fascist-like trends, the results would be to *reduce* relatively the importance of hereditary variability in the total picture. In the same way, a general trend toward democratization and equalization of opportunity would, by reducing environmental variability, *increase* the relative importance of biological variability. It is therefore the democratically-minded who should be most concerned with biological individual differences.

This argument, of course, does not mean that democracy by itself would raise the general level of intelligence. What it does mean, however, is that there would be a guarantee much greater than there now is that the favorable variations appearing all the time in human stock would have an opportunity under democracy to express themselves more fully. And it is therefore very likely that in many populations the specially endowed individual capable of doing something really important for his fellow men might well be accorded a much greater opportunity.

The Potential Role of Differential Fertility

We move now into an area of much more speculative problems. It seems pretty unlikely that a competitive society such as our own could operate over a long period without calling into play selective factors important for differential population trends. If there is any tendency at all for a certain kind of people to survive and reproduce themselves, or any tendency at all for a certain kind of people *not* to survive and reproduce themselves, there will, in the long run, be important qualitative population trends; and even without changes in central tendency, any degree of homogamy will, on the analogy of the Tryon and the Hall material mentioned earlier, tend to reinforce trends which are already identifiable. It becomes extremely important to remain very objective and cool here because most of us do not at all like the results that come out of a logical analysis at this point. It seems pretty likely that where brain rather than brawn is the basis for success in competitive life, there will be in time a tendency for brainier people to get into more favored positions, and to marry others who, likewise, being of brainy stock, find themselves in desirable positions. This tendency may be marked at some periods in history, slight in other periods. And, of course, it may be masked by the operation of many non-intellectual factors, and tremendously attenuated by the general principle of filial regression. Filial regression, however, as we saw in the case of the

animal studies, can not make a great deal of difference where the selective processes are maintained and the homogamy continues over generations. Elsewhere[2] I have tried to show that the observed (phenotypic) intellectual difference between central tendencies of the highest and the lowest social strata, which is at present between 20 and 25 I.Q. points when examined among the children of such groups, would tend to be very greatly reduced by the principles suggested by Burks; indeed, this differential *might* well come down to something like 7 or 8 points. But it seems quite unlikely that it would disappear altogether.

I would differ from most of my colleagues in psychology in one important aspect of this general problem of the implications of differential fertility. Most psychologists would say that intelligence is measurable and that temperament is not, and that intelligence is heritable on a much clearer basis than is temperament. Actually, by contemporary methods, temperament in terms of barking, meowing, screaming, kicking, etc., is as objective and measurable a behavior as is intelligence; and, as suggested above, the general lines of evidence regarding the inheritance of temperament are just as clear as they are regarding the inheritance of intelligence. Following this very speculative line of reasoning, I would suggest that competitiveness, in the sense of a primitive fund of vitality, or energy level, a certain tendency to push, pull, kick, drive against the obstacles of the environment, is probably as important and as "heritable" a trait as any with which the student of behavior is concerned; and in a competitive society one would expect, over a long period of time, that social class differentials in competitive attributes would appear and become progressively more and more important. Most of us are willing to admit that you can breed for boldness in rats; but we have, I think, been rather lacking in intellectual honesty when we put on the shelf the obvious and close analogy between human and rodent

[2] Murphy, G.; Murphy, L. B. and Newcomb, T. M.: EXPERIMENTAL SOCIAL PSYCHOLOGY (Rev. Ed.). New York, Harper & Bros., 1937. Chapter 2.

types of boldness. Another temperamental attribute we might call self-control. As you know, some studies of self-imposed inhibitions were made from a genetic viewpoint many years ago. The data are, of course, excessively crude. The student of animals and of human infants is nevertheless forcibly confronted all the time with evidence for large individual differences in impulsiveness or explosiveness, low thresholds for rage, and similar attributes related to self-control. H. J. Müller suggested some years ago[3] that human society might ultimately dare to take direct control of developing within itself, over the course of centuries, the kinds of biological dispositions which would make cooperative social living more feasible. While some will regard Müller's book as Marxist in intent, others will immediately recognize that this conception of biological predispositions to cooperativeness or competitiveness would be denounced as Fascistic by many Marxists. I wish, however, quite aside from all attempts at an ultimate philosophy of society, to recognize that Müller's conception seems to me to be an essential aspect of the type of logical analysis of differential fertility which we are now undertaking. This, of course, has led us into Frank Lorimer's fourth level of analysis. There is need, I believe, for all of the four levels which he so ably distinguished in his Presidential Address.

Further Research Needs

Finally, a few words regarding immediate research needs. All over the country there are animal laboratories maintained, at considerable cost, for the study of all sorts of animal attributes; laboratories which, with an addition of ten per cent in energy and funds, could make known to us in terms of pedigree data the kinds of things we are urgently in need of finding out about the inheritance of temperamental and emotional attributes, and of intellectual and motor types of competence. It seems to me most tragic that the geneticists, in their concern with simple Mendelian phenomena, have thrown out as waste

[3] Müller, H, J.: Out of the Night. New York, The Vanguard Press, 1935.

most of the behavior material which appears in stocks which they are examining for morphological or pathological characteristics. The pioneer work of Tryon and Hall needs to be vastly extended, and more complex species—notably dogs and the primates, need to be followed up. Hypotheses need to be much clearer and much bolder than they are. Most of them will not be confirmed, but it is only by sharp and clear hypotheses that any progress will be made. In particular, the conception that the threshold for emotional response can be quantitatively studied as an hereditary trait needs to be heavily underscored; and studies of fear, rage, and other types of emotionality need to be carried out experimentally with pedigree techniques. The thing which Tryon and Searle have been doing with the maze data needs to be done with all the materials; namely, refusing to accept an observed manifestation like maze-learning ability as a final entity, but rather reducing it to its simplest dynamic elements of perception, motivation, learning, etc. Students of parent-child resemblances and other types of resemblances in human stock need to pay as much attention to temperament as they already have to intelligence attributes, not by means of rating scales but by means of the objective tests of temperament and personality which have been developed so rapidly in the psychology of the last twenty years. And finally, we need to be much more bold with regard to the definition of hypotheses in connection with the probable effect of differential fertility upon the distribution in the population of all the various types of measurable human attributes.

Some of our problems could be solved in five years—others not in twenty-five. But this kind of research calls for courage and vision in long-range terms, guided by constantly improving biometric and psychometric techniques. We need have no diffidence regarding the importance of the ultimate contribution. What impresses me is the extreme timidity of psychologists and geneticists—their fear of being considered unscientific, or of having political axes to grind. If we really believe that the stuff of which mankind is made is important for his

effective functioning, we need to be ready to set up, and to test at once, hypotheses regarding qualitative population trends. We must be quick to admit errors as fast as we find ourselves in blind alleys, and by the same token quick to turn each hypothesis into a form which can permit objective and factual answers for the guidance of democratic policies.

SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

VII. THE INTERRELATIONSHIP OF MARITAL ADJUSTMENT, FERTILITY CONTROL, AND SIZE OF FAMILY[1]

ROBERT B. REED

IT is an obvious fact that, in our society, marriage provides an institutional framework for the process of biological reproduction. The importance of this function of marriage does not need to be stressed. However, it is almost equally obvious that the success or failure of a particular marriage is not, in general, judged directly in terms of reproductive performance. Instead, emphasis is placed upon the nature of the relationship between wife and husband and upon their attitudes toward this relationship. Thus, a couple is commonly called well adjusted and their marriage considered successful if wife and husband are happy and satisfied with their marriage.

How, then, is the marital adjustment of wives and husbands related to their reproductive performance? In the search for factors contributing to successful marital adjustment, several workers have touched upon this question. The two most comprehensive pieces of work in this field have been reported by Terman[2] and by Burgess and Cottrell.[3] On the basis of information obtained from a group of California couples Terman concluded that, although in individual cases the presence of children might affect marital adjustment either favorably or unfavorably, it had little effect on the general level of marital

[1] This is the seventh of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The Committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; Clyde V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton. The author is indebted to the members of the Committee for permission to use data collected in the study as well as for suggestions in carrying out the analysis. He is also indebted to the Milbank Memorial Fund for the fellowship which made the present paper possible.

[2] Terman, L. M.: PSYCHOLOGICAL FACTORS IN MARITAL HAPPINESS. New York, McGraw-Hill Book Co. Inc., 1938.

[3] Burgess, E. W. and Cottrell, L. S.: PREDICTING SUCCESS OR FAILURE IN MARRIAGE. New York, Prentice Hall Inc., 1939.

happiness. However, he did note that childless women past middle age were slightly less happy than the average, while husbands of the same age tended to be above the average in happiness.

Burgess and Cottrell, in their study of Illinois couples, found no difference in marital adjustment between couples with no children and couples with one child. Their two and three-child couples showed a marked decline in the proportion with good adjustment. A more significant relationship was found when the couples were grouped according to desire for children. In descending order of marital adjustment the groups were those with no children but some desired, those with one or more children which were desired, those with no children and none desired, those with one or more children which were not desired.

The results of these studies have suggested that, while the actual number of children may not be closely related to marital adjustment, the attitudes of the couple toward the number of children they have may be of importance in adjustment.

In the present paper, therefore, the reproductive performance of a series of couples is examined not only in terms of the size of the family but also in terms of the number of children desired by the couple and the extent and success of their efforts to control their fertility in accordance with their desire for children. The relationship of the marital adjustment of both wife and husband to these aspects of fertility is examined.

The Data

The data upon which the present analysis is based were collected in Indianapolis between April 15, 1941, and January 31, 1942, as part of the Study of the Social and Psychological Factors Affecting Fertility.[4] In order to obtain a relatively

[4] For a detailed description of the Study, *see* the previous articles in this series, particularly the following two:

Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. IV. Developing the Schedules, and Choosing the Type of Couples and the Area to be Studied. The Milbank Memorial Fund *Quarterly*, October, 1945, xxiii, No. 4, pp. 386–409. (Reprint, pp. 139–162.)

(Continued on page 385)

homogeneous sample, representative of a large proportion of our urban population, the Study was restricted to couples with the following characteristics:

1. Wife and husband native white.
2. Wife and husband Protestant.
3. Couple married in 1927, 1928, or 1929.
4. Wife under 30 and husband under 40 at marriage.
5. Neither wife nor husband previously married.
6. Eight years or more of residence since marriage in a city of 25,000 or over.
7. Wife and husband at least elementary school graduates.

The couples analysed in this paper were further restricted by the elimination of those classified as "relatively sterile." The "relatively sterile" group included all couples who knew (or had good reason to believe) that they were sterile during a period of at least 24 consecutive months if the wife was never pregnant, or at least 36 consecutive months if the wife had up to three live births. No couples with four or more live births were classified as "relatively sterile."

On the basis of a preliminary household survey of Indianapolis, the number of cooperative "relatively fecund" couples meeting the requirements given above was found to be 1,444. Detailed information was obtained from a sample of 860 of these couples by means of three interviews with each couple. The first of these interviews served to enlist interest in the Study and to obtain a few simple facts about the family. During the second, the wife and husband independently filled out an extensive attitude questionnaire and the interviewer obtained additional background information. The final interview was devoted primarily to obtaining from the wife a complete history of pregnancies and contraceptive practices.

Since the 860 couples that were interviewed in detail were intentionally selected so as to include a disproportionately

Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. V. The Sampling Plan, Selection, and the Representativeness of Couples in the Inflated Sample. The Milbank Memorial Fund *Quarterly*, January, 1946, xxiv, No. 1, pp. 49–93. (Reprint, pp. 163–208.)

large number of very small and very large families, it was necessary to make some adjustment in order to present a true picture of the distribution by size of family. This was accomplished by duplicating on a random basis the records of some of the couples within each size of family group. As a result of this procedure an inflated sample of 1,444 couples was obtained which, when tested on various items such as size of family, age, state of birth, education, etc., was found to be very similar to the universe of eligible couples located by means of the initial household survey. The figures presented here were based on this inflated sample of 1,444 couples obtained from the 860 couples interviewed.

Size of Family

Three measures of fertility are available in the reproductive histories of the couples. These are: (1) number of pregnancies, (2) number of live births, and (3) number of living children at the time of the Study. The concentration in small family sizes is apparent in Table 1. Two-child families accounted for more than a third of the couples, while only 9.8 per cent had four or more living children at the time of the Study.

It is obvious that pregnancies, live births and living children are closely related and that they may be expected to show similar associations with other variables. However, from the point of view of the couple, the number of living children is the most realistic measure of the size of their family. For this reason the discussion of factors related to family size will be given largely in terms of number of living children, although figures will also be presented for live births and pregnancies.

Table 1. Distribution of couples by number of pregnancies, number of live births and number of living children.

	Percentage of Couples With:					Average Per Couple
	0	1	2	3	4+	
Pregnancies	8.4	21.4	34.5	18.6	17.2	2.3
Live Births	9.3	25.3	37.4	16.2	11.8	2.0
Living Children	9.3	27.4	37.5	16.0	9.8	2.0

Marital Adjustment

Marital adjustment may be defined as the process of developing a mutually satisfactory relationship between wife and husband. Couples differ with respect to the type of relationship developed and in the extent to which this relationship is mutually satisfactory. From the viewpoint of the wife and husband, their adjustment is good if they find the marital relationship highly satisfactory, and poor if it is unsatisfactory. The present section deals with indications of good and poor adjustment defined in this manner. Later sections will examine different types of wife-husband relationship in deciding family problems.

The wives and husbands included in this Study gave independent answers to four questions designed to determine how satisfactory their marital relationships were. These questions and the distributions of replies are given below:

	Percentage Distribution of Replies	
	Wife	*Husband*
If you had your life to live over, do you think you would:		
Marry the same person?	95.0	92.6
Marry a different person?	2.9	1.9
Not marry at all?	2.1	5.5
	100.0	100.0
Everything considered how happy has your marriage been?		
Extremely unhappy Decidedly less happy than average Somewhat less happy than average	4.4	4.9
About average	27.0	26.5
Somewhat more happy than average	18.3	18.8
Decidedly more happy than average	21.5	24.0
Extremely happy	28.7	25.8
	99.9	100.0

(Continued on page 388)

	Percentage Distribution of Replies	
	Wife	*Husband*
Everyone knows that even happily married couples often disagree about some things. How much do you and your husband (wife) disagree about:		
A. Handling family finances?		
B. What to do in your spare time?		
C. Things a man should do around the home?		
D. Sexual relations?		
E. Ways of dealing with in-laws?		
Disagree very much	1.5	1.3
Much	1.6	1.9
Some	14.2	16.9
Little	16.0	19.6
Very little	66.6	60.3
	99.9	100.0
Few women (men) are completely satisfied with themselves or their husbands (wives). If you could make your husband (wife) over, how much would you want to change him (her) in the following ways:		
A. Make him (her) more affectionate?		
B. Make him (her) less selfish?		
C. Make him more considerate (her more interested) in sex relations?		
D. Make him (her) less fault-finding?		
E. Make him (her) more truthful?		
Want very much	2.4	2.4
Much	3.3	2.5
Some	13.3	15.4
Little	13.6	14.9
Very little	67.5	64.8
	100.1	100.0

It should be noted that in the last two questions each of the

lettered parts was answered separately on the five point scale indicated, and the distribution given is for all parts combined.

In examining the replies to these questions, it is evident that the couples selected for inclusion in this Study were, on the whole, well adjusted. Ninety-five per cent of the wives and 92.6 per cent of the husbands stated that they would marry the same person if they had their lives to live over. Slightly more than 95 per cent of both wives and husbands rated their marital happiness as "average" or above. In reporting amount of disagreement and desire to improve the spouse, both wives and husbands checked the categories "little" and "very little" in about 80 per cent of the cases. Consequently, terms such as good and poor adjustment when applied to this group must be interpreted as comparative expressions distinguishing between degrees of good adjustment.

Three separate indices of adjustment were obtained from the last three of the questions listed above. In the case of the question concerning marital happiness the individuals were simply divided into two groups. Those describing their marriage as "extremely happy" or "decidedly more happy than average" were classified as "happy," while those checking a lower response on the happiness scale were classified as, comparatively, "unhappy."

In this manner each wife and each husband was identified as considering the marriage happy or unhappy. Each couple was then rated on the basis of mutual happiness of wife and husband. Those couples in which both wife and husband considered the marriage happy were classified as happy couples. If wife or husband or both considered the marriage unhappy the couple was rated as unhappy.

The distribution of wives, husbands, and couples according to this scheme is shown in Table 2. Among the wives 50.2 per cent were in the happy group, while 49.7 per cent of the husbands were happy. As a result of the positive association between marital happiness of wife and husband, 32.5 per cent of the couples were rated happy.

		Husband		
		Happy	Unhappy	Total
Wife	Happy	32.5	17.7	50.2
	Unhappy	17.2	32.5	49.7
	Total	49.7	50.2	99.9

Table 2. Per cent distribution of couples according to marital happiness of wife and husband.

The set of questions dealing with amount of disagreement about various items was used in making up the second index of adjustment. The five possible replies were assigned scores of 0, 1, 2, 3, 4, from "disagree very much" to "very little." Using this scale the replies to the five parts of the disagreement question were averaged for each individual. The individuals were then divided into two groups. Those with averages over 3.5 were classified as reporting "little" disagreement and those whose average was less than 3.5 were described as reporting, comparatively, "much" disagreement.

Following the method used in dealing with happiness the couple was rated as having little disagreement if both wife and husband fell in the little disagreement group. Couples in which wife or husband or both reported much disagreement were placed in the much disagreement group.

By a method exactly parallel to that used with the disagreement question the individuals and couples were rated as reporting "little" or "much" desire to improve the spouse. The distribution of wives, husbands, and couples in these groups of little and much disagreement and desire to improve the spouse

Table 3. Per cent distribution of couples according to disagreement reported by wife and husband.

		Husband		
		Little	Much	Total
Wife	Little	33.8	24.1	57.9
	Much	17.2	24.9	42.1
	Total	51.0	49.0	100.0

		Husband		
		Little	Much	Total
Wife	Little	33.0	23.8	56.8
	Much	20.8	22.4	43.2
	Total	53.8	46.2	100.0

Table 4. Per cent distribution of couples according to desire to improve the spouse reported by wife and husband.

is given in Tables 3 and 4. The little disagreement group included 57.9 per cent of the wives, 51.0 per cent of the husbands and 33.8 per cent of the couples. Little desire to improve the spouse was found among 56.8 per cent of the wives, 53.8 per cent of the husbands, and 33.0 per cent of the couples.

Table 5. Average size of family by adjustment groups.

	Average Number of:		
	Living Children	Live Births	Pregnancies
Happiness of Marriage			
Wife: Happy	1.82	1.90	2.12
Unhappy	2.08	2.16	2.44
Husband: Happy	1.79	1.87	2.09
Unhappy	2.11	2.19	2.47
Couple: Happy	1.77	1.84	2.06
Unhappy	2.04	2.12	2.39
Amount of Disagreement			
Wife: Little	1.85	1.93	2.15
Much	2.09	2.16	2.45
Husband: Little	1.87	1.94	2.19
Much	2.03	2.12	2.37
Couple: Little	1.75	1.83	2.03
Much	2.05	2.13	2.41
Desire to Improve Spouse			
Wife: Little	1.87	1.96	2.21
Much	2.05	2.12	2.37
Husband: Little	1.90	1.97	2.23
Much	2.01	2.09	2.34
Couple: Little	1.84	1.92	2.19
Much	2.00	2.08	2.32

Marital Adjustment and Size of Family

Among the couples included in this Study, marital adjustment showed an inverse relationship with family size. This was true for all three of the adjustment indices used for wives, husbands, and couples.

Table 5 shows the differences in average family size between the good and poor adjustment groups. The most extreme difference is found in comparing husbands on the basis of happiness of the marriage. The mean number of living children among the "happy" husbands was 1.79, while the "unhappy" husbands had an average of 2.11 living children. The smallest difference was observed in comparing husbands on the basis of desire to improve their wives. The average number of living children was 1.90 for husbands with "little" desire to improve their wives and 2.01 for husbands with "much" desire to improve their wives.

Table 6. Per cent of wives, husbands, and couples reporting happy marriage, by size of family.

Size of Family	Per Cent Reporting Happy Marriage		
	Wives	Husbands	Couples
No. of Living Children			
0	58.5	62.6	40.7
1	53.5	52.0	34.8
2	50.5	49.7	32.4
3	45.9	49.4	32.0
4+	39.7	32.6	19.9
No. of Live Births			
0	58.5	62.2	40.7
1	52.6	51.2	33.4
2	51.3	50.2	33.3
3	48.3	53.4	35.5
4+	38.2	30.6	17.6
No. of Pregnancies			
0	56.2	61.2	39.7
1	53.1	53.4	34.0
2	51.8	51.4	33.9
3	53.0	49.2	35.8
4+	37.9	37.1	21.0
Total	50.2	49.7	32.5

In Tables 6, 7, 8, and Figure 1 the adjustment of various size of family groups is compared. Viewed in this direction, it is seen that, in general, the inverse relationship between adjustment and family size holds throughout the entire range of family size from zero to four or more children. Again, the most extreme difference is found in connection with the happiness of the husband. Among couples with no living children 62.6 per cent of the husbands fell in the "happy" group, but in the families with four or more living children the percentage of "happy" husbands dropped to 32.6.

In proceeding from small to large families, the decline in proportion "happy" is continuous for wife, husband, and couple. However, in the case of amount of disagreement and desire to improve the spouse, the replies of the wives of childless couples show a reversal of the general trend. Thus, the highest proportion of wives reporting "little" disagreement or "little" desire

Table 7. Per cent of wives, husbands, and couples reporting little disagreement, by size of family.

Size of Family	Per Cent Reporting Little Disagreement		
	Wives	Husbands	Couples
No. of Living Children			
0	60.0	54.8	42.2
1	66.2	52.5	39.1
2	56.4	52.1	32.9
3	52.4	51.5	29.9
4+	47.5	37.6	20.6
No. of Live Births			
0	60.0	54.8	42.2
1	66.0	52.9	38.9
2	56.7	52.0	33.1
3	53.4	54.3	32.5
4+	48.8	35.9	20.0
No. of Pregnancies			
0	56.2	54.5	40.5
1	67.0	52.1	39.5
2	60.0	53.2	36.6
3	51.9	52.6	30.2
4+	49.6	41.5	21.8
Total	57.9	51.0	33.8

Size of Family	Per Cent Reporting Little Desire to Improve Spouse		
	Wives	Husbands	Couples
No. of Living Children			
0	54.1	60.0	35.6
1	62.9	54.0	35.9
2	57.7	53.2	33.1
3	50.2	55.4	30.1
4+	50.4	46.8	26.2
No. of Live Births			
0	54.1	60.0	35.6
1	62.7	54.3	35.9
2	56.9	52.4	31.9
3	55.1	60.3	36.3
4+	48.8	43.5	24.1
No. of Pregnancies			
0	50.4	58.7	31.4
1	62.5	54.4	35.9
2	59.0	51.6	32.7
3	54.8	60.1	35.8
4+	50.8	48.4	27.8
Total	56.8	53.8	33.0

Table 8. Per cent of wives, husbands, and couples reporting little desire to improve spouse, by size of family.

to improve their husbands is found in families with one child rather than in childless families.

Although the differences found are not large, the consistency of the results based on the three adjustment indices and the agreement between the replies of wives and husbands justify the statement that among these couples good marital adjustment is associated with small family size. An exception to this generalization should be noted in the case of wives with no children. These childless women showed a tendency toward lower adjustment than the wives with one child.

Fertility Control

The basic fact which gives rise to the problem of controlling fertility, among the relatively fecund couples included in this Study, is the excess of potential over desired fertility. That is,

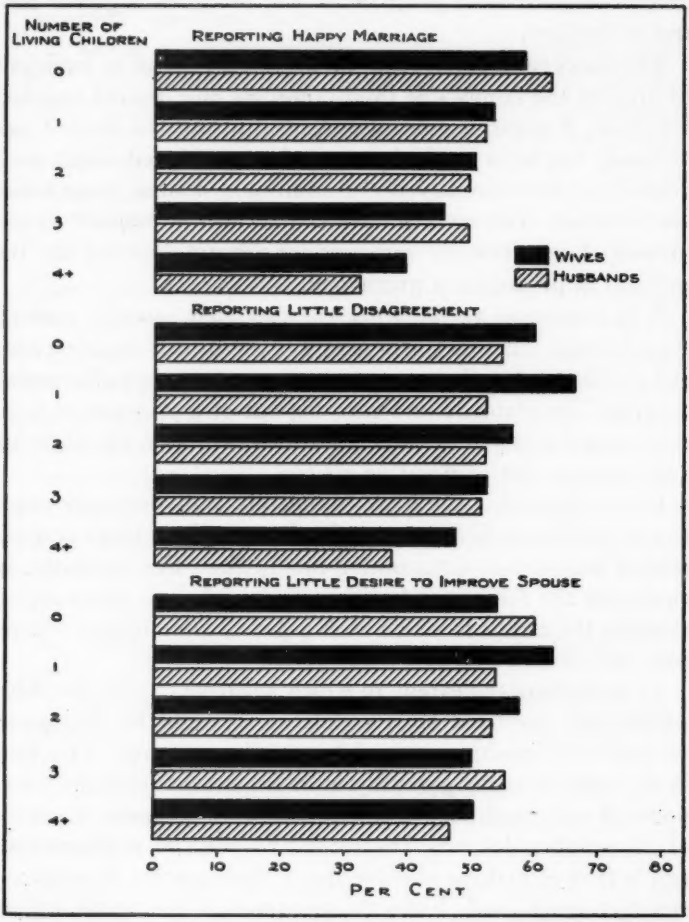

Fig. 1. Per cent of wives and husbands reporting happy marriage, little disagreement with spouse, and little desire to change spouse, by number of living children. (*See* Tables 6, 7, 8.)

unless a couple takes action to prevent conception, pregnancies will normally occur more rapidly and in greater number than the couple desires. Initial control of fertility must, therefore, take the form of prevention of unwanted pregnancies. The

process of preventing pregnancies will be called negative control of fertility.

The successful application of negative control is sufficient to prevent the family size from exceeding any desired number. However, if negative control is started before the desired size of family has been reached, it must be interrupted either accidentally or intentionally if the additional desired pregnancies are to occur. The term postive control will be applied to the process of intentionally interrupting negative control for the purpose of producing a pregnancy.

It is important to recognize the fact that positive control, thus defined, is not the mere failure or absence of negative control and does not follow as a necessary consequence of negative control. The planning and carrying out of a program of positive control is dependent upon, but distinct from, the planning and carrying out of negative control.

It is evident that the more completely and effectively negative control is applied by a couple, the more important positive control becomes in determining family size. Consequently, in analyzing the completed fertility of a couple it is necessary to examine the extent to which both negative and positive control were exercised.

In evaluating the extent to which negative control has been successfully exercised by a couple, it is useful to distinguish between two functions served by negative control. The first, in the sense of being generally more important from the viewpoint of the couple, is the prevention of pregnancies in excess of the number desired. The second function of negative control is that of making possible the desired spacing of pregnancies that are wanted. From the viewpoint of the couple, failure to space pregnancies is less serious than failure to control the total number. Consequently, the following three categories of success in applying negative control were defined.

1. Complete negative control. A couple has exercised complete negative control if no pregnancies occurred other than those

resulting from positive control, *i.e.*, both number and spacing of pregnancies have been controlled.

2. Adequate negative control. A couple has exercised adequate negative control if one or more pregnancies were not the result of positive control, but the total number of pregnancies did not exceed the number desired, *i.e.*, number but not spacing has been controlled.

3. Inadequate negative control. A couple has exercised inadequate negative control if the number of pregnancies exceeded the number desired, *i.e.*, the number was not controlled.

Since a couple cannot exercise positive control of fertility, as defined above, without also exercising negative control, the effectiveness of positive control can be compared satisfactorily only among couples exercising complete negative control. All pregnancies occurring in this group of couples were the result of positive control, and the extent to which positive control was exercised may be judged by a comparison of the actual number of pregnancies with the number of pregnancies desired. This comparison suggests the following three categories of success in applying positive control when negative control is complete.

1. Positive control absent. Positive control was absent if no pregnancies occurred.

2. Inadequate positive control. A couple has exercised inadequate positive control if the total number of pregnancies was less than the number desired.

3. Adequate positive control. A couple has exercised adequate positive control if the desired total number of pregnancies was obtained.

Material suitable for classifying fertility control was contained in the pregnancy and contraceptive records obtained from the wives in this Study. Pregnancies which, according to the wife's statement, occurred during periods when contraception had been stopped for the purpose of conceiving were considered the result of positive control and will be described as positively controlled or planned. Following the definition

stated previously, 403 couples, with all pregnancies planned or with no pregnancies, exercised complete negative control.

In distinguishing between adequate and inadequate negative control use was made of the wife's statements concerning the extent to which each pregnancy was desired by herself and by her husband. A pregnancy was considered to be wanted if the wife stated that it was wanted by both wife and husband either at the time it occurred or at some later time. Negative control was classified as adequate among 659 couples, whose last pregnancy was wanted in this sense or was positively controlled. The remaining 382 couples, whose last pregnancy was not wanted, exceeded the number of pregnancies desired and were placed in the inadequate negative control group. It should be noted that in distinguishing between adequate and inadequate negative control the few illegally aborted pregnancies were disregarded on the grounds that these pregnancies were, in one sense, prevented.

A further breakdown of the inadequate negative control group was made on the basis of the number of unwanted pregnancies. If the number of pregnancies after the last wanted by the wife plus the number after the last wanted by the husband was one, two, or three, the average of pregnancies unwanted by the wife and pregnancies unwanted by the husband was one-half, one, or one and one-half. Couples with these averages were placed in a group designated the "one-too-many" group. Couples with a larger average number of unwanted pregnancies were placed in a "two-plus-too-many" group. The study included 280 of the former type and 102 of the latter.

The adequate negative control group was also separated into two parts. Those couples whose last pregnancy was positively controlled or who were exercising positive control at the time of interview, as well as the few couples who had terminated all pregnancies or all pregnancies after the last planned pregnancy by illegal abortion, had definitely planned the number of their pregnancies. These couples, totaling 205, were placed in a "number-planned" group. The remainder of the adequate con-

trol group, 454 couples who wanted but did not plan the last pregnancy, were placed in a "quasi-planned" group.

In classifying the couples with complete negative control according to positive control, the 121 couples with no pregnancies obviously form the group among whom positive control was absent. Among the remaining couples in the complete negative control group, the distinction between adequate and inadequate positive control was based on independent replies of wife and husband to the question: "If you could begin your married life over again and the size of your family could be determined only by your liking for children, how many would you have?" Couples with a number of pregnancies (or live births, if live births exceeded pregnancies due to multiple births) smaller than the number of children desired by both wife and husband were placed in the inadequate positive control group. One hundred and seventy-two couples had exercised inadequate positive control according to this criterion. The remaining 110 couples with complete negative control were placed in the adequate positive control group.

It is of interest to note that in 102 of the 121 couples with no pregnancies both wife and husband expressed a desire for one or more children. From this it appears that absence of positive control represents, for the most part, failure to obtain the desired number of pregnancies, and is more closely related to inadequate than to adequate positive control.

The distribution of the couples in the fertility control groups described above is given in Table 9.[5] It is apparent that these couples exercised a high degree of negative control over fertility. Nearly three-quarters of the group succeeded in preventing pregnancies in excess of the number desired, and 27.9 per cent

[5] This grouping of the couples may be compared with the fertility planning classification presented in the article immediately preceding this one in the series, Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. VI. The Planning of Fertility. The Milbank Memorial Fund *Quarterly*, January, 1947, xxv, No. 1, pp. 63–111. The "Complete Negative Control" and "Inadequate Negative Control" groups in the present article are identical respectively to the "Number and Spacing Planned" and "Excess Fertility" groups of the previous article. The terms "Number-planned," "Quasi-planned," "One-too-many," and "Two-plus-too-many" refer to the same couples in both articles.

Fertility Control Group	Per Cent	
Complete Negative Control	27.9	
Positive Control: Absent		8.4
Inadequate		11.9
Adequate		7.6
Adequate Negative Control	45.6	
Number-Planned		14.2
Quasi-Planned		31.4
Inadequate Negative Control	26.5	
One-Too-Many		19.4
Two-Plus-Too-Many		7.1
Total	100.0	100.0

Table 9. Distribution of couples according to fertility control.

had no unplanned pregnancies. However, under the criteria used here, only a relatively small proportion, 7.6 per cent, who not only succeeded in preventing unplanned pregnancies but also planned the number desired, can be regarded as entirely successful in controlling fertility.

Fertility Control and Size of Family

Since the categories of fertility control were defined largely on the basis of a comparison of the actual number of pregnancies with the number desired by the couple, size of family may be expected to vary between fertility control groups. In general, success in negative control should tend to reduce family size while success in positive control should have the opposite effect.

Table 10 shows the variation in average family size according to fertility control group. Couples exercising complete negative control had an average of 1.04 living children. The average rose to 1.98 living children for couples with adequate negative control, and to 2.86 living children among couples whose negative control was inadequate.

The "number-planned" group had slightly larger families, on the average, than the "quasi-planned" group. This was due to the fact that one-child families were practically excluded from

Fertility Control Group	Average Number of:		
	Living Children	Live Births	Pregnancies
Complete Negative Control	1.04	1.06	1.15
Positive Control: Absent	0	0	0
Inadequate	1.27	1.29	1.32
Adequate	1.81	1.88	2.15
Adequate Negative Control	1.98	2.08	2.32
Number-Planned	2.16	2.28	2.59
Quasi-Planned	1.91	1.99	2.20
Inadequate Negative Control	2.86	2.95	3.39
One-Too-Many	2.40	2.48	2.82
Two-Plus-Too-Many	4.11	4.25	4.96
Total	1.95	2.03	2.28

Table 10. Average size of family by fertility control group.

the "number-planned" families by the requirement that they should have at least one planned and one unplanned pregnancy. With this minor exception, size of family decreased with increasing negative control.

Among the couples exercising complete negative control, those with positive control absent had no pregnancies by definition. Couples with inadequate positive control averaged 1.27 living children. Those couples exercising adequate positive control had an average of 1.81, a figure only slightly below that for the adequate negative control group. Thus, size of family increased with increasing positive control.

Table 11 gives the distribution of the 1,444 couples according to number of living children and fertility control group, and shows in more detail the association between these variables. It may be seen that over half of the families with three children and an even higher proportion of the larger families fell in the inadequate negative control group. On the other hand only 15 per cent of the couples with one child exercised inadequate negative control. The remaining one-child families were concentrated chiefly in the "quasi-planned" and inadequate positive control groups.

Fertility Control Group	No. of Living Children					
	0	1	2	3	4+	Total
Complete Negative Control	*126*	*156*	*105*	*13*	*3*	*403*
Positive Control: Absent	121	0	0	0	0	121
Inadequate	3	121	46	2	0	172
Adequate	2	35	59	11	3	110
Adequate Negative Control	*8*	*182*	*332*	*98*	*39*	*659*
Number-Planned	4	22	130	38	11	205
Quasi-Planned	4	160	202	60	28	454
Inadequate Negative Control	*1*	*58*	*104*	*120*	*99*	*382*
One-Too-Many	1	58	95	96	30	280
Two-Plus-Too-Many	0	0	9	24	69	102
Total	135	396	541	231	141	1,444

Table 11. Distribution of couples by fertility control and number of living children.

Marital Adjustment and Fertility Control

The variation in marital adjustment of couples in different fertility control groups is shown in Tables 12, 13, 14, and Figures 2 and 3. The most obvious relationship demonstrated is the decline of adjustment with decreasing negative control. For example the proportion of couples reporting "happy" marriages was 45.2 per cent among couples with complete negative

Table 12. Per cent of wives, husbands, and couples reporting happy marriage, by fertility control group.

Fertility Control Group	Per Cent Reporting Happy Marriage		
	Wives	Husbands	Couples
Complete Negative Control	60.3	62.5	45.2
Positive Control: Absent	56.2	61.2	39.7
Inadequate	62.2	61.1	45.4
Adequate	61.8	66.4	50.9
Adequate Negative Control	53.6	50.8	33.8
Number-Planned	62.4	51.7	39.5
Quasi-Planned	49.6	50.4	31.3
Inadequate Negative Control	34.0	34.6	17.0
One-Too-Many	35.4	36.4	17.9
Two-Plus-Too-Many	30.4	29.4	14.7
Total	50.2	49.7	32.5

Fertility Control Group	Per Cent Reporting Little Disagreement		
	Wives	Husbands	Couples
Complete Negative Control	62.0	53.8	38.2
Positive Control: Absent	56.2	54.6	40.5
Inadequate	57.0	43.0	25.0
Adequate	76.4	70.0	56.4
Adequate Negative Control	61.2	53.1	37.6
Number-Planned	63.9	54.2	40.4
Quasi-Planned	59.9	52.6	36.3
Inadequate Negative Control	47.9	44.2	22.5
One-Too-Many	50.0	46.8	24.3
Two-Plus-Too-Many	42.1	37.2	17.6
Total	57.9	51.0	33.8

Table 13. Per cent of wives, husbands, and couples reporting little disagreement, by fertility control group.

control of fertility, dropped to 33.8 per cent in the adequate negative control group, and dropped still further to 17.0 per cent in the inadequate negative control group. The subcategories of adequate and inadequate control show the same trend. Thus, "happy" marriages occurred in 39.5 per cent of the "number-planned" couples, 31.3 per cent of the "quasi-

Table 14. Per cent of wives, husbands, and couples reporting little desire to improve spouse, by fertility control group.

Fertility Control Group	Per Cent Reporting Little Desire to Improve Spouse		
	Wives	Husbands	Couples
Complete Negative Control	56.3	59.0	35.5
Positive Control: Absent	50.4	58.7	31.4
Inadequate	60.5	53.5	33.7
Adequate	56.4	68.2	42.7
Adequate Negative Control	60.6	57.2	37.3
Number-Planned	67.3	59.5	43.4
Quasi-Planned	57.5	56.2	34.6
Inadequate Negative Control	51.1	42.4	23.0
One-Too-Many	51.8	43.6	23.9
Two-Plus-Too-Many	49.0	39.2	20.6
Total	56.8	53.8	33.0

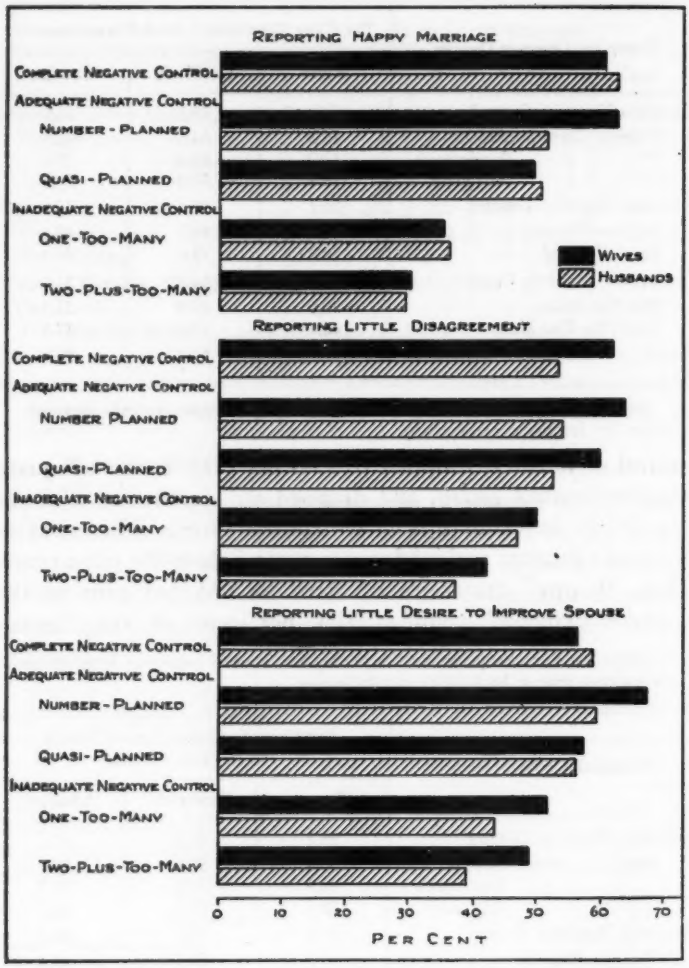

Fig. 2. Per cent of wives and husbands reporting happy marriage, little disagreement with spouse, and little desire to change spouse, by extent of negative control of fertility. (*See* Tables 12, 13, and 14.)

planned," 17.9 per cent of the "one-too-many," and 14.7 per cent of the "two-plus-too-many."

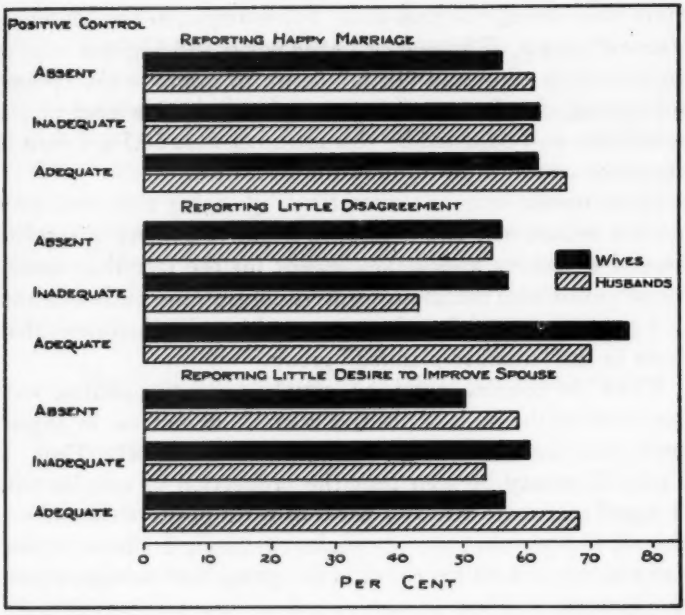

Fig. 3. Per cent of wives and hubands reporting happy marriage, little disagreement with spouse, and little desire to change spouse, by extent of positive control of fertility. Data restricted to "Complete Negative Control" couples. (*See* Tables 12, 13, and 14.)

In all three indices of adjustment, the replies of both wives and husbands showed a decrease in the proportion of well-adjusted individuals with decreasing effectiveness of negative control. However, on the basis of amount of disagreement and desire to improve the spouse, little difference was found between couples with complete and couples with adequate negative control. In fact, among couples with complete negative control, the wives reported greater desire to improve the spouse than did the wives in the adequate group.

Furthermore, when the adequate negative control group was subdivided, a tendency was found toward higher adjustment in the "number-planned" families than in those with complete negative control. This tendency is more marked among the

wives than among the husbands. For example, in the "number-planned" group, 67.3 per cent of the wives and 59.5 per cent of the husbands expressed "little" desire to improve the spouse, but among couples exercising complete negative control the proportion well adjusted by this criterion were 56.3 per cent of the wives and 59.0 per cent of the husbands.

These results may be summarized by saying that success in marital adjustment and success in negative control of fertility showed a positive association, except for the fact that among couples exercising complete negative control, the husbands and, to a greater extent, the wives reported lower adjustment than those in the "number-planned" group.

When the couples exercising complete negative control were examined on the basis of positive control, an increase in adjustment was found with increasing positive control. Thus, in Table 12 it may be seen that the proportion of couples with "happy" marriages was 39.7 per cent when positive control was absent, 45.4 per cent among couples exercising inadequate positive control, and 50.9 per cent in the group with adequate positive control.

Although this trend was not perfectly uniform throughout the indices used, the adjustment of the adequate positive control group exceeded that of the group in which positive control was absent on the basis of the rating of wives, husbands, and couples for all three adjustment indices. The adjustment of the adequate positive control group was higher than that of the inadequate positive control group in all cases except for the wives' reports of amount of disagreement and desire to improve their husbands.

In comparing the inadequate positive control group with the couples exercising no positive control, a consistent difference between wives and husbands was found in all three indices. The husbands tended to report higher adjustment when positive control was absent than when it was present but inadequate. On the other hand the wives tended to have higher adjustment when positive control was inadequate than when it was absent.

In general, on the basis of these data it appears that success in positive control of fertility, like success in negative control, is associated with good marital adjustment. On the basis of all three indices used, the highest proportion of well-adjusted husbands was found in the group that was most successful in both negative and positive control. The ratings of wives and couples showed maximum adjustment either in the group having greatest success in negative and positive control or in the "number-planned" group, which was also highly successful in negative control and had at least exercised positive control in the last pregnancy.

Marital Adjustment, Fertility Control, and Size of Family

Because the fertility control groups have been shown to vary in average size of family, it is important to determine whether the observed relationship between marital adjustment and fertility control is independent of the size of family. For this reason, the couples with two living children were examined separately. This size of family was selected as the only one which occurred with sufficient frequency in the various fertility control groups to make comparisons possible.

The results, as shown in Tables 15, 16, and 17, are of the

Table 15. Families with two living children. Per cent of wives, husbands, and couples reporting happy marriage, by fertility control group.

Fertility Control Group	Per Cent Reporting Happy Marriage		
	Wives	Husbands	Couples
Complete Negative Control	63.8	68.6	51.4
Positive Control: Inadequate	60.9	63.0	47.8
Adequate	66.1	72.9	54.2
Adequate Negative Control	50.9	49.4	31.9
Number-Planned	61.5	50.0	36.2
Quasi-Planned	44.1	49.0	29.2
Inadequate Negative Control	35.6	31.7	14.4
Total	50.5	49.7	32.4

Fertility Control Group	Per Cent Reporting Little Disagreement		
	Wives	Husbands	Couples
Complete Negative Control	62.9	58.1	41.9
Positive Control: Inadequate	52.2	39.1	19.6
Adequate	71.2	72.9	59.3
Adequate Negative Control	57.2	52.7	34.9
Number-Planned	69.2	60.0	43.8
Quasi-Planned	49.5	48.0	29.2
Inadequate Negative Control	47.1	44.2	17.3
Total	56.4	52.1	32.9

Table 16. Families with two living children. Per cent of wives, husbands, and couples reporting little disagreement, by fertility control group.

same type as those obtained from the group as a whole. Throughout these tables, the minimum proportion of well-adjusted wives, husbands, and couples was found in the group exercising inadequate negative control. With one exception, maximum adjustment was found among the couples whose negative control was complete and whose positive control was adequate. The exception occurred in the wives' reports of desire to improve the spouse, where the highest proportion with "little" desire to improve the husband was found in the "number-planned" group. In all cases the group exercising

Table 17. Families with two living children. Per cent of wives, husbands, and couples reporting little desire to improve spouse, by fertility control group.

Fertility Control Group	Per Cent Reporting Little Desire to Improve Spouse		
	Wives	Husbands	Couples
Complete Negative Control	61.9	61.9	41.0
Positive Control: Inadequate	60.9	54.4	32.6
Adequate	62.7	67.8	47.5
Adequate Negative Control	61.5	55.1	36.2
Number-Planned	73.8	60.8	46.2
Quasi-Planned	53.0	51.5	29.7
Inadequate Negative Control	42.3	38.5	15.4
Total	57.7	53.2	33.1

adequate positive control showed better adjustment than the group with inadequate positive control.

Thus, among the two-child families, success in marital adjustment was postively associated with success in both negative and positive control of fertility. This suggests that the relationship observed between marital adjustment and fertility control is to some extent, if not completely, independent of the size of family.

It would also be of interest to ask the reverse question, *i.e.*, "Is the observed inverse relationship between size of family and marital adjustment independent of success in controlling fertility?"

A major difficulty in investigating this question lies in the fact that the fertility control categories that were established are not completely homogeneous with regard to success in controlling fertility. Thus, for example, among the "two-plus-too-many" group the four-child families may be expected to have had more unwanted pregnancies than the three-child families. At the other extreme, among the families with complete negative and inadequate positive control, the two-child families may

Table 18. Average number of living children by happiness of marriage and fertility control.

Fertility Control Group	Happiness of Marriage					
	Wife		Husband		Couple	
	Happy	Unhappy	Happy	Unhappy	Happy	Unhappy
Complete Negative Control	1.06	1.00	1.05	1.01	1.12	.97
Positive Control:						
Inadequate	1.25	1.31	1.29	1.25	1.29	1.25
Adequate	1.82	1.79[1]	1.79	1.84[1]	1.84	1.78
Adequate Negative Control	1.96	2.01	1.95	2.02	1.97	1.99
Number-Planned	2.12	2.22	2.08	2.24	2.09	2.20
Quasi-Planned	1.88	1.93	1.90	1.92	1.91	1.90
Inadequate Negative Control	2.87	2.85	2.80	2.89	2.86	2.86

[1] Average based on 25 to 50 couples. All others based on more than 50 couples.

be expected to have come closer to the number of children desired by wife and husband than the one-child families.

These fertility control groups could be made more homogeneous by further subdivision. However, the comparatively small number of couples included in the Study makes any additional subdivision of the fertility control groups impractical.

Tables 18, 19, and 20 show the average number of living children for the well and poorly adjusted wives, husbands, and couples in the various fertility control groups. In the inadequate negative control group there was no consistent indication of either positive or negative association between adjustment and size of family.

Throughout the adequate negative control group and its two subcategories, the "number-planned" and "quasi-planned" groups, there was a consistent tendency for the better adjusted groups to have smaller families. As was pointed out above, however, within those groups smaller families may indicate more successful negative control of fertility.

In the complete negative control group a reversal of the general trend occurred. On the basis of all three indices of adjustment for wives, husbands, and couples there was a slight

Table 19. Average number of living children by amount of disagreement and fertility control.

Fertility Control Group	Amount of Disagreement					
	Wife		Husband		Couple	
	Little	Much	Little	Much	Little	Much
Complete Negative Control	1.06	1.00	1.05	1.03	1.10	1.00
Positive Control:						
Inadequate	1.23	1.32	1.27	1.28	1.26	1.28
Adequate	1.71	2.12[1]	1.73	2.00[1]	1.66	2.00[1]
Adequate Negative Control	1.92	2.08	1.93	2.05	1.85	2.06
Number-Planned	2.13	2.20	2.14	2.17	2.13	2.17
Quasi-Planned	1.82	2.03	1.83	1.99	1.71	2.02
Inadequate Negative Control	2.77	2.94	2.82	2.89	2.77	2.89

[1] Average based on 25 to 50 couples. All others based on more than 50 couples.

tendency for better adjusted couples to have larger families. However, in the subgroups exercising inadequate and adequate positive control the usual inverse relationship between size of family and adjustment occurred on the basis of reports of disagreement and desire to improve the spouse, and the evidence was mixed on the basis of happiness of marriage.

Thus, in general, within the fertility control categories used here, size of family tended to show an inverse relationship with marital adjustment. An exception to this occurred in the group exercising complete negative control. However, this reversal of the general trend was due to the increase of both adjustment and family size with increasing positive control rather than to any direct association between family size and adjustment within the positive control groups.

Dominance of Wife or Husband

In addition to distinguishing between good and poor marital adjustment, it is possible to speak of various types of adjustment. One basis for classifying types of adjustment is the relative importance of wife or husband in conducting the affairs of the family. In order to determine who was responsible for deci-

Table 20. Average number of living children by desire to improve spouse and fertility control.

Fertility Control Group	Desire to Improve Spouse					
	Wife		Husband		Couple	
	Little	Much	Little	Much	Little	Much
Complete Negative Control	1.06	1.01	1.06	1.01	1.07	1.02
Positive Control:						
Inadequate	1.26	1.29	1.28	1.26	1.24	1.29
Adequate	1.77	1.85[1]	1.79	1.86[1]	1.72	1.87[1]
Adequate Negative Control	1.90	2.11	1.97	2.00	1.89	2.04
Number-Planned	2.04	2.48	2.12	2.20	2.04	2.24
Quasi-Planned	1.83	2.01	1.89	1.92	1.80	1.96
Inadequate Negative Control	2.76	2.96	2.99	2.76	2.95	2.83

[1] Average based on 25 to 50 couples. All others based on more than 50 couples.

sions dealing with a variety of family problems, the wives and husbands in the Study were asked to reply to the following set of questions:

	Percentage Distribution of Replies	
	Wife	*Husband*
In some families many of the following things are decided by the husband, in other families by the wife, and in still others by the husband and wife together.		
Who usually decides in your family:		
A. Whether or not you can afford new furniture?		
B. Which movies you see together?		
C. Where to go on the pleasure trips you take together?		
D. If you are both listening to the radio, which programs to hear?		
E. Which couples to keep as friends?		
F. Which house to rent or buy?		
More often my husband (wife)	13.2	13.7
More often myself	9.8	9.4
Fifty-fifty	77.0	74.9
	100.0	100.0

The distribution of replies given above represents the combined answers to all six questions. It is, however, characteristic of the replies to the separate questions, all of which showed a heavy concentration on the answer "fifty-fifty" and a tendency on the part of both wife and husband to attribute responsibility for decisions to the spouse rather than to themselves.

The high frequency of the statement that these family problems were decided on a fifty-fifty basis indicates either that dominance of wife or husband in deciding these family questions is quite rare, or that the couples were reluctant to recognize and report such dominance. It is possible that if the couples had been offered a choice of more than three answers,

fewer wives and husbands would have checked the "fifty-fifty" reply.

When the replies to these questions were tabulated against size of family and fertility control, no significant relationships were found. There was a slight tendency for the wives with no children to rate themselves more dominant than did the other wives. However, this probably indicates that the women with no children had more time and attention to devote to general family matters than did the wives who had children to attend to.

Responsibility for Negative Control

Although the replies of these couples did not indicate any very clear relationship between dominance in general family matters and fertility or fertility control, results of more interest were obtained when attention was turned to the relative importance of wife and husband in dealing with the problem of controlling fertility.

To determine the role of wife and husband in preventing unwanted pregnancies, the wives and husbands were asked the following question:

> Among couples where neither husband nor wife wants another child which should take the responsibility to see that pregnancy is avoided?
>
> —— usually the husband
>
> —— usually the wife
>
> —— one as much as the other

The distribution of the replies to this question is given in Table 21. Both wife and husband showed such a heavy tendency to assign the responsibility for negative control on a fifty-fifty basis that it is difficult to compare couples on this item. However, it was found useful to examine the following four groups of couples defined in terms of combinations of the replies of wife and husband:

1. Couples in which both wife and husband tended to assume the responsibility themselves. This group, designated "self" in

		Husband's Reply			
		Wife	50/50	Husband	Total
Wife's Reply	Wife	1.3	4.5	.4	6.2
	50/50	6.3	62.9	12.1	81.3
	Husband	1.3	8.8	2.4	12.5
	Total	8.9	76.2	14.9	100.0

Table 21. Who should be responsible for avoiding unwanted pregnancies? Per cent distribution of couples according to wives' and husbands' replies.

the table, included the following combinations of replies: (a) wife said "wife," husband said "husband"; (b) wife said "wife," husband said "one as much as the other"; (c) wife said "one as much as the other," husband said "husband."

2. Couples in which wife and husband agreed that the wife should be responsible or that the husband should be responsible, designated "wife or husband" in the table.

3. Couples in which wife and husband agreed that the responsibility should be taken by one as much as the other, designated "50/50" in the table.

4. Couples in which both wife and husband tended to assign the responsibility to the spouse. This group, designated "spouse" in the table, included the following combinations of replies: (a) wife said "husband," husband said "wife"; (b) wife said "one as much as the other," husband said "wife"; (c) wife said "husband," husband said "one as much as the other."

From Table 21 it may be seen that 17.0 per cent of all couples were included in the group in which wife and husband tended to assume the responsibility for avoiding unwanted pregnancies themselves, 3.7 per cent definitely assigned responsibility to the wife or to the husband, 62.9 per cent placed the responsibility equally on wife and husband, and in 16.4 per cent wife and husband tended to place the responsibility upon the spouse.

Table 22 shows the distribution of these combinations of wives' and husbands' replies for the various negative control categories. Among couples exercising complete negative control, 8.2 per cent assigned responsibility to either wife or husband, whereas only 1.3 per cent of the couples with inadequate

Fertility Control	Both Wife and Husband Reply				
	Self	Wife or Husband	50/50	Spouse	Total
Complete Negative Control	19.1	8.2	59.6	13.2	100.1
Adequate Negative Control	18.2	2.3	65.3	14.3	100.1
Number-Planned	22.0	2.9	62.0	13.2	100.1
Quasi-Planned	16.5	2.0	66.7	14.8	100.0
Inadequate Negative Control	12.6	1.3	62.6	23.6	100.1
One-Too-Many	11.8	1.4	63.9	22.9	100.0
Two-Plus-Too-Many	14.7	1.0	58.8	25.5	100.0
Total	17.0	3.7	62.9	16.4	100.0

Table 22. Who should be responsible for avoiding unwanted pregnancies? Per cent distribution of combined replies of wife and husband according to negative control of fertility.

negative control reported agreement of this type. The complete negative control group also had a larger proportion of couples in which both wife and husband assumed the responsibility themselves. On the other hand, among 23.6 per cent of the couples in the inadequate negative control group the wife and husband tended to pass the responsibility to the spouse, while wives and husbands rejected the responsibility in only 13.2 per cent of the complete negative control group.

When the replies of wives and husbands are examined separately in Table 23, the greatest contrast between the complete and inadequate negative control groups is found in the husband's willingness to assume the responsibility. Among couples exercising inadequate negative control 10.7 per cent of the husbands felt they should be responsible for avoiding unwanted pregnancies, while 21.6 per cent of the husbands in the complete negative control group felt that they should take the responsibility.

It appears from these results that success in negative control of fertility was associated with agreement of the couple that one spouse should be responsible for avoiding unwanted pregnancies, or with acceptance of the responsibility by both wife and husband. On the other hand, failure in negative control

was associated with the rejection of responsibility by both wife and husband. In this difference between couples which were successful or unsuccessful in negative control, the difference in the attitude of the husband was of more importance than that of the wife.

Dominance in Positive Control

Several questions which the couples answered give some information as to the relative importance of the spouses in exercising positive control of fertility. Among these were the following two hypothetical questions placed at some distance from each other in the attitude questionnaire:

> If you wanted another child very much but your husband (wife) did not, would he (she) be willing to plan to have it?

Table 23. Who should be responsible for avoiding unwanted pregnancies? Per cent distribution of wives' and husbands' replies according to negative control of fertility.

Fertility Control	Wife's Reply			
	Wife	50/50	Husband	Total
Complete Negative Control	5.7	79.9	14.4	100.0
Adequate Negative Control	8.2	82.2	9.6	100.0
Number-Planned	10.2	79.5	10.2	99.9
Quasi-Planned	7.3	83.5	9.3	100.1
Inadequate Negative Control	3.1	81.2	15.7	100.0
One-Too-Many	2.5	82.1	15.4	100.0
Two-Plus-Too-Many	4.9	78.4	16.7	100.0
Total	6.2	81.3	12.5	100.0
	Husband's Reply			
	Wife	50/50	Husband	Total
Complete Negative Control	8.4	70.0	21.6	100.0
Adequate Negative Control	7.6	79.2	13.2	100.0
Number-Planned	5.9	77.6	16.6	100.1
Quasi-Planned	8.4	80.0	11.7	100.1
Inadequate Negative Control	11.5	77.7	10.7	99.9
One-Too-Many	11.8	77.5	10.7	100.0
Two-Plus-Too-Many	10.8	78.4	10.8	100.0
Total	8.9	76.2	14.9	100.0

If your husband (wife) wanted another child very much but you did not, would you be willing to plan to have it?

Replies to both of these questions were made on a five point scale including the following possibilities: definitely no, probably no, doubtful, probably yes, definitely yes.

The wife's answers were compared to determine whether she considered herself or her husband more dominant in deciding whether they should have a child under the conditions of these questions. If the replies indicated that the wife felt she would be less willing than her husband to plan for a child wanted by the spouse, she was classified as considering herself dominant in making the decision. If the wife checked the same answer for both questions she was classified as considering that both she and her husband had equal influence. If the wife's replies indicated that she felt her husband would be less willing than she to plan for a child wanted by the spouse, she was classified as considering her husband dominant.

In a similar manner, the replies of the husband to these two questions were compared to obtain his judgment of the relative influence of his wife and himself in deciding about having a child. The distribution of these judgments of dominance in planning for children based on wives' and husbands' replies is given in Table 24.

It should be noted that this and related tables are limited to the couples exercising complete negative control of fertility. Since these were the couples that had exercised positive fertility

Table 24. Is wife or husband less willing to plan for a child desired by the spouse? Per cent distribution of couples with complete negative control of fertility according to wives' and husbands' replies.

		Husband's Reply			
		Wife	50/50	Husband	Total
Wife's Reply	Wife	12.9	8.4	4.7	26.0
	50/50	11.4	21.3	9.7	42.4
	Husband	5.5	18.4	7.7	31.6
	Total	29.8	48.1	22.1	100.0

control in the case of all pregnancies, the attitudes of such couples toward dominance in positive control are probably more realistic than those of couples having some or all of their pregnancies unplanned.

Following the method used in dealing with the question of responsibility for avoiding unwanted pregnancies, four groups of couples were identified according to combinations of the replies of wife and husband. These groups were:

1. Couples in which both wife and husband tended to consider themselves dominant in positive control, designated "self" in the table.
2. Couples in which wife and husband agreed that the wife was dominant or that the husband was dominant, designated "wife or husband."
3. Couples in which wife and husband agreed that neither was dominant, designated "50/50."
4. Couples in which both wife and husband tended to assign the responsibility to the spouse, designated "spouse."

The distribution of these combinations was tabulated for the three positive control categories and is shown in Table 25.

The proportion of couples in which both wife and husband rated themselves dominant in planning for children increased from 11.6 per cent among couples which failed to exercise positive control to 30.9 per cent among couples exercising adequate

Table 25. Is wife or husband less willing to plan for a child desired by the spouse? Per cent distribution of combined replies of wife and husband according to positive control of fertility.

Fertility Control	Both Wife and Husband Reply				
	Self	Wife or Husband	50/50	Spouse	Total
Positive Control:					
Absent	11.6	19.8	19.0	49.6	100.0
Inadequate	25.6	19.2	23.8	31.4	100.0
Adequate	30.9	23.6	20.0	25.5	100.0
Total, Complete Negative Control	22.8	20.6	21.3	35.3	100.0

positive control. The proportion of couples in which wife and husband rated the spouse dominant showed a corresponding drop from 49.6 per cent in the group where positive control was absent to 25.5 per cent in the group with adequate positive control.

Separate distributions of the replies of wives and husbands are given for the positive control groups in Table 26. Both wives and husbands showed the same tendency to rate themselves more dominant and their spouses less so as success in positive control increased.

A second estimate of dominance in positive control of fertility was obtained from three questions dealing with the attitudes and plans of the couples at the time of the Study. Two of the questions, dealing with the attitudes of the couple toward having another child, were:

> How much do you want another child sometime?
> How much does your husband (wife) want another child sometime?

Answers to both of these were given in the following five categories: very much against it, rather objects, doesn't want but wouldn't object, rather wants, wants very much.

Another question, dealing with plans for a child, was:

> Are you planning to have another child sometime?

Table 26. Is wife or husband less willing to plan for a child desired by the spouse? Per cent distribution of wives' and husbands' replies according to positive control of fertility.

Fertility Control	Wife's Reply				Husband's Reply			
	Wife	50/50	Husband	Total	Wife	50/50	Husband	Total
Positive Control:								
Absent	19.8	37.2	43.0	100.0	34.7	50.4	14.9	100.0
Inadequate	25.0	47.7	27.3	100.0	28.5	45.9	25.6	100.0
Adequate	34.5	40.0	25.5	100.0	26.4	49.1	24.5	100.0
Total, Complete Negative Control	26.0	42.4	31.6	100.0	29.8	48.1	22.1	100.0

		Husband's Reply			
		Wife	50/50	Husband	Total
Wife's Reply	Wife	5.7	12.9	2.2	20.8
	50/50	16.4	26.6	8.2	51.2
	Husband	6.9	14.9	6.2	28.0
	Total	29.0	54.4	16.6	100.0

Table 27. Does plan for another child coincide more closely with desires of wife or husband? Per cent distribution of couples with complete negative control of fertility according to wives' and husbands' replies.

Replies to this question were given in five categories as follows: definitely yes, probably yes, doubtful, probably no, definitely no.

The replies of the wife to these three questions were compared to determine whether the reported desire of wife or husband fell closer to the plan for another child on the five point scale used. For example, if the wife stated that she rather wanted another child, that her husband was very much against it, and that they were probably not planning another child, the wife was classified as feeling that her husband's desires were dominant in their planning. (Table 27.)

Estimates of dominance in planning children were obtained in this manner from the replies of the wife and husband. As in the previous estimate of dominance in positive control the combinations of wives' and husbands' replies were tabulated for

Table 28. Does plan for another child coincide more closely with desires of wife or husband? Per cent distribution of combined replies of wife and husband according to positive control of fertility.

Fertility Control	Both Wife and Husband Reply				
	Self	Wife or Husband	50/50	Spouse	Total
Positive Control:					
Absent	17.4	12.4	24.0	46.3	100.1
Inadequate	26.2	12.2	22.7	39.0	100.1
Adequate	25.5	10.9	35.5	28.2	100.1
Total, Complete Negative Control	23.3	11.9	26.6	38.2	100.0

Fertility Control	Wife's Reply				Husband's Reply			
	Wife	50/50	Husband	Total	Wife	50/50	Husband	Total
Positive Control:								
Absent	19.0	48.8	32.2	100.0	33.9	55.4	10.7	100.0
Inadequate	25.0	44.2	30.8	100.0	30.2	51.2	18.6	100.0
Adequate	16.4	64.5	19.1	100.0	21.8	58.2	20.0	100.0
Total, Complete Negative Control	20.8	51.2	28.0	100.0	29.0	54.4	16.6	100.0

Table 29. Does plan for another child coincide more closely with desires of wife or husband? Per cent distribution of couples with complete negative control of fertility according to wives' and husbands' replies.

the three positive control groups. The results, as shown in Table 28, indicate the same tendency for success in positive control of fertility to be associated with the feeling on the part of both wife and husband that they themselves and not their mates are the dominant ones in deciding about having a child. The individual replies of wives and husbands, as shown in Table 29, showed the same type of relationship with positive control as the combined replies.

The final question dealing with the relative importance of wife and husband in deciding problems dealing with having a child was:

> Among couples where the husband and wife do not agree about having another child which should usually make the final decision?
>
> —— certainly the wife
> —— probably the wife
> —— the one who wants it
> —— the one who doesn't want it
> —— probably the husband
> —— certainly the husband

In tabulating the results the two replies "the one who wants it" and "the one who doesn't want it" were combined in the group "wife or husband." The distribution of the replies of wives and husbands to this question is given in Table 30. It is

		Husband's Reply					
		Cert. Wife	Prob. Wife	Wife or Husband	Prob. Husband	Cert. Husband	Total
Wife's Reply	Cert. Wife	9.9	5.5	3.2	.7	0	19.3
	Prob. Wife	15.4	14.4	6.7	1.5	0	38.0
	Wife or Hus.	9.7	12.2	6.5	2.5	.2	31.1
	Prob. Hus.	2.0	2.2	2.5	1.5	1.0	9.2
	Cert. Hus.	2.0	0	0	.5	0	2.5
	Total	39.0	34.3	18.9	6.7	1.2	100.1

Table 30. Should wife or husband make the final decision about having another child? Per cent distribution of couples with complete negative control of fertility according to wives' and husbands' replies.

of interest to note that while in 45.2 per cent of the couples the wife and husband agreed that the wife either probably or certainly should make the final decision about having another child, only 3.0 per cent of the couples agreed that the husband should make the decision.

For the purpose of comparing the couples in different positive control groups, three types of combinations of wife's and husband's answers were used. If both gave the same reply, the couple was placed in a group labeled "same" in Table 31. The couples in this group fall on the diagonal running from the upper left to the lower right in Table 30. The cells above or to the right of this diagonal include couples in which the wife showed a greater tendency than the husband to assign the decision to the wife, and, similarly, the husband showed a greater tendency than the wife to assign the decision to the husband. Therefore, these couples were placed in a group labeled "self." Couples in cells below or to the left of the diagonal showed the opposite tendency and were placed in a group labeled "spouse."

It may be seen in Table 31 that the groups in which positive control was absent and inadequate did not differ greatly in the distribution of these combinations of replies of wife and husband. The adequate positive control group differed from the other two in containing a higher proportion of couples in which

Fertility Control	Wife and Husband Reply			
	Self	Same	Spouse	Total
Positive Control:				
Absent	20.7	30.6	48.8	100.1
Inadequate	19.2	28.5	52.3	100.0
Adequate	25.5	40.0	34.5	100.0
Total, Complete Negative Control	21.3	32.3	46.5	100.1

Table 31. Should wife or husband make the final decision about having another child? Per cent distribution of combined replies of wife and husband according to positive control of fertility.

wife and husband gave the same reply, a higher proportion in which wife and husband tended to feel that they themselves should decide, and a lower proportion in which wife and husband tended to feel that the decision should be left up to the spouse.

The results obtained from all three of these indices of dominance in positive control of fertility indicate that success in positive control was associated with the tendency of both wife and husband to feel that they themselves were, or should be, chiefly responsible for deciding whether the couple should have a child. On the other hand, failure in positive control was associated with the tendency for both wife and husband to leave this decision to the spouse.

Summary

Among the couples included in this analysis three broad relationships between marital adjustment and reproductive performance were found. Briefly stated, these were:

1. A decline in marital adjustment with increasing family size.
2. An increase in marital adjustment with increasing success in controlling fertility according to the desires of the couple.
3. An increase in success in controlling fertility with increasing willingness of both wife and husband to take responsibility for fertility control.

In interpreting these findings it is necessary to remember that the conclusions should certainly not be expected to hold

outside of a native white, Protestant, urban group such as the one studied. It is also important to remember that this analysis is based largely on attitudes of the wife and husband that may be expected to change with time. An attempt was made by age and duration of marriage restrictions to limit the study to couples with sufficient experience to have well-crystallized and realistic opinions on subjects such as the problems of family planning and marital happiness. A study of a young group looking forward to marriage and having a family or of an older group well past reproductive age might be expected to yield somewhat different results. Similarly, couples incapable of having children would probably exhibit attitudes differing somewhat from those of the relatively fecund couples included in the present sample.

From the point of view of population replacement, the inverse association between family size and marital adjustment is of particular interest. Although the relationship found was not large, the consistency of the three indices of adjustment and of the replies of wife and husband make it appear that the goal of raising a large family and the goal of having a happy marriage, while not incompatible, were not identical.

The finding of a positive association between success in marital adjustment and success in control of fertility throws some light on the lower adjustment of the couples with larger families, since the proportion of couples who failed to prevent unwanted pregnancies increases rapidly with increasing family size.

Thus, it appears that among these couples the major problem of family planning was the prevention of excess pregnancies and that success in solving this problem was associated with achieving a happy marriage.

However, among the couples that evidenced complete success in preventing unwanted pregnancies a second problem of fertility control arose. This was the problem of planning as many children as the couple wanted. Success in solving this also appeared associated with success in achieving a happy marriage.

Without more detailed study, probably involving observation of the course of marital adjustment and family planning throughout the married life of the couples, it is impossible to decide whether good marital adjustment contributed to the ability of the couple to plan and control their fertility, or success in controlling fertility increased their happiness and marital adjustment. It seems likely that both of these processes may take place and that the control of fertility according to the couple's desires and the development of good marital adjustment are mutually interdependent.

The findings that success in controlling fertility was associated with willingness of the wife and husband to accept responsibility for fertility control is similarly open to two interpretations. It is reasonable to believe that couples in which both wife and husband take an active interest in family planning are, because of that fact, more successful in obtaining the number of children they want than couples in which neither spouse feels responsible for family planning. However, it is possible that the statements of the couples concerning responsibility for family planning were colored to some extent by the success which had attended their attempts to control fertility. The wives and husbands may have been influenced in part by a willingness to accept responsibility for success more readily than responsibility for failure.

Although this discussion has been in terms of marital adjustment and fertility without reference to other variables, it is obvious that additional factors are present in the problem. High economic status, for example, has been shown in the past to be associated with low fertility. It is also associated to some extent with good marital adjustment and probably with success in controlling fertility. Thus, differences in economic status or some similar variable may account, in part, for the relationships found between marital adjustment, size of family, and fertility control. It is hoped that further analysis of the couples will throw some light on the influence of the economic and other factors.

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